modern machine shop

FEATURES IN

See Page 2

SURFACE

FINISHING See Page 102

SAFETY

TRAINING See Page 134

OCTOBER

1957



Proper sharpening can reduce the cost of most perishable tools by making them last twice as long. See page 79. RO
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ADAMAS "GRADE A" PERFORMANCE WINNER

For its role as the "standard of the industry" Adamas Grade A ranks as performance winner among all competing 6% cobalt straight tungsten carbide grades, (industrial classification C-2).

Grade A's outstanding performance in cutting tools, dies, and wear parts has won the applause of carbide users throughout the United States and Canada. Here is a dramatic sample of Adamas Grade A throwaway inserts in action on a typical turning operation of Navy "type D" cast iron . . .

192 pieces per corner with a .250 depth of cut, 170 S.F.P.M. and .018 feed.

Even in the carbide industry, stars are made not born. Grade A's success is the result of Adamas' unique manufacturing processes which give Grade A its superior combination of three key metallurgical properties: . . . hardness . . . density . . . and transverse rupture strength.

Benefit from Grade A's metallurgical superiority . . . write today for your free copy of "Grade A . . . Metallurgical Facts and Application Tips"

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PLATING AND SURFACE FINISHING FACILITIES FOR A MACHINE SHOP

By C. C. Clayton

At the Torrance, California plant of Douglas Aircraft Company, a machine shop with its own processing facilities has been in operation for some time and, despite the compromise that still requires 10 per cent of the parts to be processed outside, the arrangement has proved most satisfactory.

Page 102

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ach

HANDLING OF JIGS AND DIES

By Ira S. Roberts

Woven wire slings enable Grumman Aircraft Engineering Corporation to quickly and easily manufacture or repair dies and jigs.

Page 108

DRILL JIG FOR VARIABLE-CENTER HOLE DRILLING

By Alex S. Arnott

This article describes a device which permits the simultaneous drilling of two holes in $\frac{1}{8}$ by 1-inch sheet iron at 3 to 12-inch center distances.

Page 110

PRODUCING ALUMINUM AIRCRAFT PARTS

By Bartlett West

Alcoa's Cleveland Works produces bulkhead forgings for Boeing B-52 Stratofortress that have cut total machining man-hour requirements by approximately 62 per cent.

Page 112

this issue

OCTOBER 1957 . VOL. 30 . No. 5

HOW TO LEAD SUCCESSFUL INDUSTRIAL CONFERENCES

By Alfred M. Cooper

Included in this educational discussion of conference-leading techniques are a large number of easyto-follow suggestions which are designed to assist the shop or office supervisor in making his conferences more worthwhile.

Page 116

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COLD-FORMING SPLINED AXLE SHAFTS

Using three cold-forming machines, Chrysler Corporation's Lynch Road plant in Detroit rolls splines into automobile rear axle shafts at the rate of 360 parts per hour per machine. Illustrations show overall and close-up views of the machines employed for this operation.

Page 126

A SAFETY TRAINING FORMULA

By J. E. Bedford

The author presents a time-tested formula for safety training, used by machine shop executives, that is easy to apply and remember.

Page 134

PRODUCTION GRINDING OF ENGINE SLEEVES

By L. B. Lorain

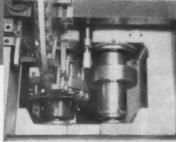
The International Harvester Company's Melrose Park Works uses a special fixture incorporating an expanding mandrel for the close-tolerance grinding of dry liner sleeves for engines.

Page 142

automated



THREAD ROLLING



The automatic features of the LANHYROL Thread Rolling

Machine have enabled one large company to automate its process for producing track bolts.

One man now handles the *entire* operation . . . bolt blanks are cold-formed from wire stock by passing through a wire-drawer into a two-blow header, then thread-rolled and ejected as finished parts. Difficult and costly handling of hot-forged bolt blanks has been eliminated—thread finish is considerably improved.

The LANHYROL Machine produces excellent threads at unequalled rates of output, and has unusual range and flexibility. For detailed information, send specifications and ask for Bulletin E-60.

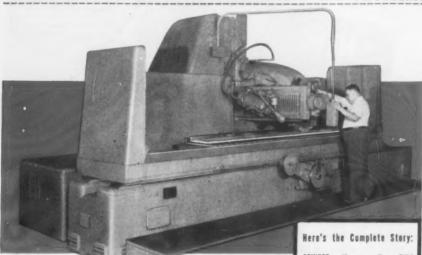
495

LANDIS Machine COMPANY

WAYNESBORO - PENNSYLVANIA - U.S.A

For more data circle 305 on Reader Service Card

When large parts must be ground to total tolerances of .0005" or less THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM SOLVE THE PROBLEM!



Machine ways up to 118" for The Michigan Tool Company's Roto-Flo Spline Rollers must be ground to .0005" total tolerance. Heat distortion, caused by hydraulic heat, became a critical problem in achieving this tolerance.

During the three months of operation since the installation of Thompson's new Hydra-Cool Hydraulic System", these long ways are being ground to consistent .0003".0004" total tolerances. Heat distortion is eliminated. Scrap loss is reduced to zero. Grinding time is greatly reduced.

THOMPSON GRINDERS WITH THE NEW HYDRA-COOL HYDRAULIC SYSTEM MAY BE THE ECONOMICAL SOLUTION TO YOUR GRINDING PROBLEM. WRITE TODAY FOR FULL PARTICULARS.

Hydra-Cool also offers you these exclusive advantages:

- Heat damage to hydraulic seals, valves, controls and pump is eliminated.
- Break down of additive-type hydraulic oils is prevented—sludge will not form in the Hydra-Cool System.
- · Lengthy warm-up periods are eliminated.
- Power costs are greatly reduced.

Hydra-Cool is standard on all Thompson surface grinders 40 inches and up in work length AT NO EXTRA COST. GRINDER: Thompson Type CXV 36" x 36" x 120" with horizontal and vertical heads.

PART: 118" way for Michigan Tool Co. Roto-Flo Spline Roller.

RATE OF TABLE TRAVEL: 100 ft./Min.

MATERIAL REMOVED: .065",

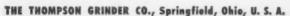
METAL: Flame hardened Ductile

SURFACE GRINDERS

WHEEL: 20x4x12 H Grade.

SCRAP LOSS: None.

GRINDING TIME: 3-4 hrs.



*Pat. Applied For

"Keep THOMPSON in mind for that daily grind"

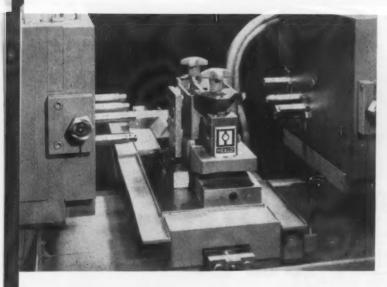
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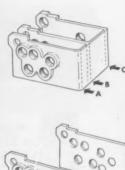
October, 1957

modern machine shop



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Holes Borized on Left End

HOW TO BORIZE

MULTIPLE HOLES ON CLOSE CENTERS

in one fully-automatic cycle!

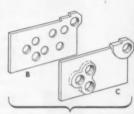
New Multi-Spindle Boringheads make it as easy as A, B, C

PRECISION boring of closely-spaced multiple holes used to be a slow and laborious job — done one-at-atime on large, costly equipment that required highly-skilled operators. But not any more!

The new Heald Multi-Spindle Boringheads put high-precision, closecenter borizing on a mass-production basis. Used with any Heald Bore-Matic, this Multi-Spindle head will precision Borize any practical number of holes, on centers as close as %", at a single pass of the table—and duplicate the same operation again and again.

A Multi-Spindle head unit consists of a supporting frame which mounts interchangeable spindle plates, precision bored to receive the required number and arrangement of miniature precision Red-Head boringheads.

For the complete story on this important new development, send for Bulletin 2-021-022-1 Issue 1.



Holes Borized on Right End

HERE'S A GOOD EXAMPLE

The Model 122 Bore-Matic shown above is equipped with Multi-Spindle Boringheads on both ends, to precision finish close-center bores in a small transmission housing. The setup shown, with 5 heads on the left and 4 on the right, is designed to bore and face 17 different holes. All operations are performed in a single, fully automatic cycle, with just one chuck-

ing of the work, and no indexing.

IT PAYS TO COME TO HEALD

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

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__SHARP __TOUGH __TEETH

FOR HIGH-PRODUCTION METAL SAWING

Barnes Hack Saw Blades have built-in cutting power. The teeth of all Barnes blades are milled to a fine sharpness, accurately set for balance, precisely heat treated for maximum cutting ability.

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RED ARROW (18-4-1)

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Last word in capaciti accuracy and i



vertical travel

Rugged Bed-Type Table. Has 3-way bearing. Bed 36" wide; saddle 46" long

Convenient, Simple Operation, Longitudinal hand-wheel in front; easily moved counterbalanced spindle and spindle head.

Choice Of 3 Measuring Methods. Hardened and ground precision screws-locating counters-dial indicator equipment

Many Other Exclusive Features. Mail coupon today for complete information



TWO TABLE SIZES 18" x 52" — 28" longitudinal travel 18" x 60" — 36" longitudinal travel

W. B. KNIGHT MACHINERY CO. 3922 West Pine Blvd. . St. Louis 8, Mo.

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☐ Have representative call.

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...there's

Publication No. M-1664-6.



ARBOR - STYLE B

No. 50 Series—%" to 2½" diam. No. 40 Series—%" to 1¼" diam.



QUICK CHANGE SHELL END MILL ARBORS



SHELL END MILL ARBORS



COLLET ADAPTERS



OR JOB LOT MILLING

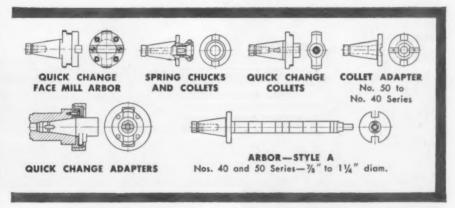
a Cincinnati accessory for the Job!

Cincinnati offers a wide range of high-quality milling machine accessories, designed to facilitate any type of milling operation. A few of them are illustrated here. All are manufactured to the highest standards of quality. Arbor collars, for example, are hardened; the ends are ground and lapped to assure squareness. ¶ An attractive 24-page catalog contains tabulations of all sizes and styles of CINCINNATI® Milling Machine Arbors and Accessories. One section, devoted to "How to Handle, Store and Use Arbors" is of interest to everyone concerned with the operation of milling machines. A copy of this informative catalog is yours for the asking.

THE CINCINNATI MILLING MACHINE CO.

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MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES • HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

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TWO MORE ALL

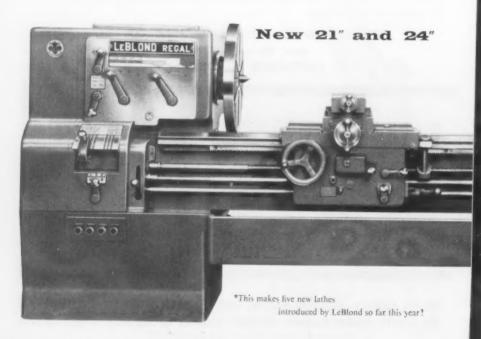
The new 21" and 24" LeBlond Regals give you capacity, speeds and horsepower you'd find in more expensive heavy type machines offered by other builders—and at one of the most attractive prices LeBlond has ever offered!

Here's the rundown. Standard 7½ HP, optional 10 HP for high speed ranges in both models (see chart); electric clutch and brake; feed reverse at the apron; heat-treated gears in head, quick-change box and

apron—plus all the famous big-lathe features that have made LeBlond Regals production favorites from coast to coast.

Headstock uses the same combination gear-belt drive construction that proved itself on the famous LeBlond Dual-Drive and is now incorporated on our new [6* heavy-duty lathe. Bed has hardened and ground replaceable steel ways like the ways on our larger machines. They are fitted according to the compensating

TWO MORE ALL



NEWLEBLONDS

veeway principle to insure better distribution of forces for proven long-time accuracy and minimum wear.

Again, like higher-priced lathes, Regals are equipped with both feed rod and preloaded precision leadscrew for continued accuracy in thread chasing. Other biglathe features—3 bearing spindle. Automatically-lubricated quick-change box. Wide carriage bridge with ample bearing surface. Rugged tailstock with plug clamping. In addition, you get general dimen-

sions and construction details patterned after LeBlond heavy-duty engine lathes.

All of LeBlond's 70 years of experience has gone into the design and building of these new Regals. Only from the builder of a complete line of lathes can you get a low-priced lathe with all these big-lathe features. Get full details on the new 21" and 24" LeBlond Regal Lathes. See your LeBlond Distributor or write — Ask for Bulletin R-205 %.

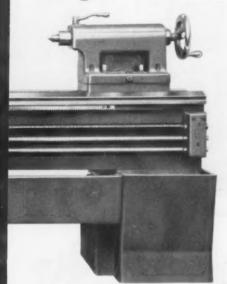
NEW LEBLONDS



Exclusive LeBlond

Combination Gear-Belt Drive

Regal lathes deliver up to 10 H.P.!



STANDA	RD AND OPTIONAL SPEED RANGES 21" and 24" REGALS
12 Standard Spe	eds:
Gear Drive Belt Drive	18, 25, 35, 49, 70, 98, 136, 192 rpm. 260, 362, 510, 720 rpm.
12 Optional Spec	ds:
Gear Drive Belt Drive	27, 38, 53, 74, 105, 146, 204, 288 rpm. 390, 544, 765, 1080 rpm.

. , cut with confidence

THE R. K. LEBLOND MACHINE TOOL COMPANY Cincinnati 8, Ohio

L*BLOND of Circinati

World's Largest Builder of A Complete Line of Lathes for More Than 70 Years

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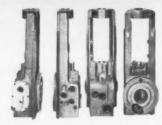
October, 1957

modern machine shop

Tool slides precision with BURGMASTER

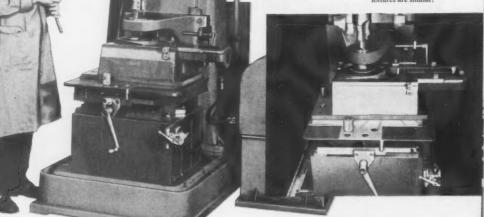
TWO MODELS

2BH-6 spindle-1/2" capacity
3BH-8 spindle-1/2" capacity



Tool slides showing all four sides from which precision machining operations are performed.

Close-up view showing pin locator air locked fixture for holding tool slide in first set-up. Other fixtures are similar.



Specialists in High Production Turret Drilling



1C Manual Power Index 36" Capacity



I'll Manual Power Index



2BF Flange Mounte Fower Index 34" Capacity



2BH Automatic Hydraulic 34" Capacity



3BH Automatic Hydraulic 1½" Capacity



BR Ram Type Radial Drill 34" Capacity



2PT-3PT Automatic Tape Controlled 34" and 11½" Capacity

machined 5 times faster AUTOMATIC HYDRAULIC 8-SPINDLE TURRET DRILL

Burgmaster Automatic Hydraulic Turret Drills are designed to give both precision and speed. On machine slides, 26 operations on 14 centers are now machined in 2.5 hours average, which formerly required 12.5 hours on a horizontal boring mill -a saving of 80%. These operations include drilling, boring, reaming, spotfacing, and tapping, with bores held to .0004" tolerance and centers to .001". Although the machine is used for many other jobs, this one alone repaid its cost in 11/2 years.

Automatic hydraulic machine operation is the answer which provides power indexing to the eight-spindle turret, pre-selects spindle speeds, provides infinitely variable pre-selective feeds, rapid approach and return, and accurate depth control. All operations are carried out at their most efficient rate for high finish, precision, accuracy, speed, and longest tool life.

(112" CAPACITY)

Burgmaster engineers are prepared to suggest similar savings on your work. There is a Burg direct representative or dealer near you-consult them freely-there is no obligation.

S.F. 3.725 x 34 deep 3.625; 1.125 Multi-Bore 2 230 w: 25 -1 29-45° x 3.800 Multi-Bore F. 3.7396-3.7400 520 S.F. .988 F. 11/16 x 5-9/32 deep, 15/32 347 F. 1.000-.9996 2.075 x 21/2 deep F. 2.062-2.064 S.F. 1.8489-1.8499 . 1.8489-1.8499 F. .750-.751 S.F. 1.8503; 2-5/16 C'Bore F 1.8503-1.8507 565 S.F. 1.8503-1.8507; 1-11/16 F 1.8503-1.8507 S.F. 1.837; C'Bore 2.062 x .750 F 1.8489-1.8499 347 F 6255- 6250 8.F. 1.472; F 1.500 45° x 1.625 F 1.5740-1.5745 520 1-9/16-16 NF2 1.562; F 1.750 x 5.985 F 2½ C'Bore F 1.574-1.5745 S.F. .737; F .812-.815 115 C'Bors 114 x 3,2500 F .750-.751 %"-14NF-2 Tax 115 Note Shift Part-Repeat operations 3, 4, 5. 33/16 .750-.751 x .370 S.F. 1.562 F. 1.750 x 3.110 565 375

F 1.5745-1.5740

How the job is run

Machine: Burgmaster 3BH Automatic Hydraulic 8-Spindle Turret Drill.

Part: Machine Slide.

Material: Close grain Moly Cast Iron.

Quantity: 50 per batch.

Holding: Special Pin Locator Air Locked Fixture, for each Set-up.

Closest Tolerances: .0004" on Bores, .001" hetween Centers.

Tooling: Carbide Tipped Tools.

Floor to Floor Time: 2.5 hours

Former Time: 12.5 hours each on Boring Mill.

Saving: 10 Hours each or 80%.

Write for bulletin describing Burgmaster 6 and 8 spindle Au-tomatic Hydraulic Turret Drills in de-tall. Twenty-minute 16mm sound film showing Burgmaste turret drills in oper-ation, including the new automatic pos tioning table, avail-able from any office.

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Detroit 37, Mich. 13730 W. Eight Mile Rd. Lincoln 8-4333 San Francisco, Calif. 1341 Old County Rd. Belmont, Calif. LYtle 1-0309

Plus dealer representatives in other industrial centers.



SECTION VI

Blacks enter with ends exposed. After tapping ends and top, hey are rotated to car pasition for tapping banks and sides. Final pasition is bettern up for tapping pen reil and under banks.

SECTION V-

Valve litter heles are drilled, rough reamed, finish reamed and inspected.

SECTION IV-

With blocks in car position, meuning pads are milled, cylinder head bank faces are drilled, chamfered and counterbered and deep oil heles are drilled.

SECTION III-

Blacks are lurned on sides. Then distributer hale is rough and semi-finish bered, all hales in top are drilled and chamfered and crankshaft bearing cap hales and all holes are drilled in betom.

SECTION. II-

Blacks are turned 90 degrees, all hales in ends are drilled and chamfered, three ail gallery holes are pressure tested and cam shaft bearing diameters are rough bared. Then blacks are turned to car position.

SECTION I

Blocks enter bottom up. Oil pan screw holes are drilled, transfer spots are machined in pan rail, under banks are drilled and chemfered and blacks are turned to cor position.

LINE C

LINE

1300 ft.
Transfer-matic
Performs
2291 Operations
on V-8 Blocks

Here is the answer to the automobile industry's insistent request for machine tools which will reduce the cost of model changes and shorten change-over periods. This giant "Sectionized" Transfer-matic is constructed with an entirely new set of Cross building blocks and applies new concepts of standardization to machine bases, transfers, fixtures and heads.

- * Capacity to machine any passenger car engine block.
- 270 stations in 17 sections, each with independent controls; sections operate automatically as blocks are made available; any section may be stopped without interrupting production of others.
- ★ 2291 operations on 185 blocks simultaneously.
- * Rated capacity of 350 cylinder blocks per hour.
- Cross Machine Control Units with Toolometers for efficient tool programming.
- * Pre-set tools to reduce downtime.



Section and V

Another Automation First by Cross Photo shows Established 1898 Sections II, III, IV and V of Line A. First in Automation
PARK GROVE STATION . DETROIT 3. MICHIGAN

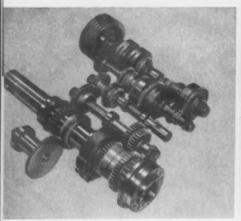
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nobile r mae the horten 'Secructed Cross chine neads. sseneach secy as any ithout thers. blocks linder with protime.

WANT HEAVY CUTS WITHOUT VIBRATION?

blacks are furned to car U U U Deposition.

WANT MORE POWER, MORE SPEEDS?



NEW HEADSTOCK GEAR TRAIN—sixteen different spindle speeds available, powered by up to 30 h.p. single-speed driving motor delivering full power at all speeds. Spindle is mounted on selected pre-loaded, precision-tapered roller bearings. Heavier, more rugged design provides smoother, quieter power.

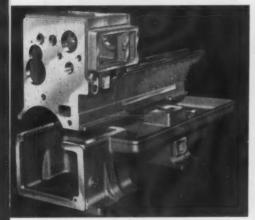


HYDRAULIC SPEED SELECTOR—smooth, effortless speed changes. No waiting, no computing, no stopping of spindle no releasing of main drive clutch. Operates direct or pre-set. Hi-Lo Lever permits instantaneous speed changes in 8:1 ratio without moving Speed Selector handwheel. Multiple Disc Clutches have automatic take-up for wear.

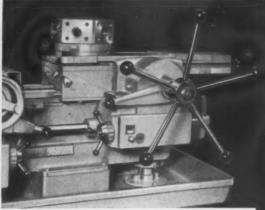
YOU GET THEM ALL...PLUS



WANT HEAVY CUTS WITHOUT VIBRATION?







NEW TURRET RAM AND SADDLE—designed wider, heavier, more rigid to handle increased capacity and higher speeds. Dial-type feed selector makes feed changes faster, easier. Turret ram rigidly supported on 64-66 Rockwell C alloy steel way strips. Power transmitted through serrated tooth clutches, with shear pin protection against overloading.

GREATER VERSATILITY...WITH THE

RAM TYPE TURRET LATHE

YOU'LL SPEED UP your production jobs—both large and small—with this more powerful, more versatile Gisholt MASTERLINE Ram Type Turret Lathe.

Here is a machine designed from end-to-end for easier setups, faster change-over and higher productive output than ever before. Check the advanced features illustrated above. Note the reserve power to handle your heaviest cuts—and to meet your tooling requirements of tomorrow. Note the extra spindle speeds—all at your operator's finger tips, without computing—for faster, better turning of

any type material. And look over the new massive design, the over-all ruggedness that permits greater accuracy, closer tolerances, deeper cuts at punishing feeds without vibration.

Find out now how this powerful, flexible Gisholt MASTERLINE Ram Type Turret Lathe can reduce floor-to-floor time on your specific jobs. Call your Gisholt Representative today—let him show you how this advanced machine can fit most profitably into your production picture. Or write direct to Gisholt for the new literature described below



READY NOW—all-new, 18-page illustrated Bulletin No. 1174-B, covering features, accessories, tools and floor plans on new Gisholt MASTERLINE Ram Type Turret Lathes. Ask for it!



GISHOLT

Madison 10, Wisconsin, U.S.A.

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . PACKAGING MACHINES . MOLDED FIBERGLAS PLASTICS

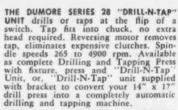
Here's How A Mower Manufacturer

drills, taps, spotfaces 400% FASTER

with DUMORE Series 28 AUTOMATIC

"DRILL - N - TAP"





YOU CAN SAVE HUNDREDS OF DOLLARS IN FIRST COST ALONE WITH THESE DU-MORE AUTOMATIC DRILL UNITS . . .

Series 24 - fully automatic with all controls built-in. Ideal for varying runs and frequent changeovers . . . Series 26 — Same as Series 24 with just basic controls for long, uninterrupted runs.

JACOBSÉN MFG. CO. combines readily available Stand-

ard Dumore Components with simple fixturing and indexing to quickly build this special-purpose machine for faster, lower cost production on brass connecting rods.

5 Dumore "Drill-N-Tap" Units, mounted on a Dumore Drill Press Stand, serve as driving heads. A simple hand indexing ring moves the set-up to each drill-ing, tapping and spotfacing station. Only 75 pieces per hour were produced by previous methods. Now, production is 350 per hour — nearly 400% faster!

In addition, Jacobsen can use these Dumore Units for other work. They are merely detached, by the simple nose mounting devices and carried to new set-ups . . . storing the original set-up until needed again.

Get a Demonstration Now . . See Your Distributor, or Write



AUTOMATIC DRILL AND TAP UNITS PORTABLE MILLING UNITS MICRO-DRILLS . TOOL POST . AND HAND GRINDERS

Made by the makers of the famous. universally used DUMORE TOOL POST GRINDER





DUMORE DRILL GRINDER Series 21

For fast, accurate sharpening of all 2lip twist drills (including crankshaft) from No. 70 to 1/4".



DUMORE AUTOMATIC DRILL HEADS

Series 20

For high production drilling of small parts. No. 80 to 5/32" capacity.



MICRO-DRILLS Series 27

Drills small holes to .001" without specially trained operators. Two models.



DUMORE DRILL STANDS

Circular or rectdngular table fixture presses.

AND BRACKETS

FOR MORE INFORMATION ON THESE PRECISION TOOLS-WRITE FOR CATALOG



Specialists do the job better: In the Air...and in the Shop, too

Since 1934, TWA Captain Ormond M. Gove has specialized in safe flight. Since 1916, Carlton has specialized, too. Our specialty: radial drill research, engineering and manufacturing. Our entire energies have been concentrated to produce the most modern radial drills on the market – nothing else. Whatever you require, be it arm lengths from 3-ft. to 12-ft. or column diameters from 9" to 26", count on Carlton. For programming, pre-select, partial pre-select and manual speed-feed controls, count on Carlton. And for added productivity, you can count on special Carlton engineered bases, tables and jigs. The Carlton Machine Tool Co., Cincinnati 25, Ohio.





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NOW! FROM HENDEY... all new 32-speed



More rigidity, more threading features, more lathe per dollar!

geared-head lathes

Here are two all-new Hendey lathes, with 32-speed geared head (up to 2000 rpm), complete set of threading features, and heavyduty design combined with toolroom precision. Automatically lubricated headstock transmission is through crowned, flame-hardened spur gears. You select speeds simply by shifting gears. Simplified mechanical design gives you low maintenance costs — more machine, dollar for dollar, than any similar lathe.

Three sets of super-precision tapered roller bearings support the spindle at both ends and in the middle, increasing accuracy and improving finish. Automatic spindle adjuster eliminates manual adjustment of bearings regardless of spindle speed. Extra-heavy bed casting is made of dense, wear-resistant semi-steel, induction-hardened and ground on all way surfaces. Available with 15, 20, or 25 hp spindle drive. Equipped with load meter and automatic over-

load release for carriage feed.
And look at these threading features: (1) multiple-thread indexing spindle, (2) built-in thread-chasing dial, (3) 66 feed and thread-changes, (4) reverse lever on apron, (5) automatic micrometer stops, (6) ball-thread-chasing stop on cross-feed screw, (7) hardened and precision-ground cross-feed screw and compound screw, (8) automatic, filtered lubrication to half nuts.

Weighing almost 400 lb, the tailstock can be positioned easily with one hand. Ways under it are hardened and ground. Large $4\frac{1}{2}$ in. diameter spindle has full 10 in. extension, with slow and rapid traverse speeds.







BARBER-COLMAN COMPANY
104 Leomis St., Reckford, Illinois



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If your operations call for turning, boring, facing, forming, grooving, chamfering, beveiling, or cut-off of parts such as these (pieces shown merely suggest the almost endless variety), there's a CLAUSING Hydra-Cycle for handling these operations in combination or singly, with great speed, to close tolerances, and at low cost.



Six surfaces are being machined in the eperation shown above. As is the case with most jobs that can be handled by the Hydra-Cycle, the tooling required is simple, inexpensive.

NO OBLIGATION OFFER!

Simply send us complete data . . . drawings of rough and finished part, indicating material, tolerances, finish required, production rate—and, samples of finished and unfinished parts. Our engineering department will gladly make recommendations for the use of the Hydra-Cycle model best suited to your requirements. Ne obligation. Mull to Hydra-Cycle Department, Clausing Division, Atlas Press Company, Kalamazoo, Michigan.

500%

PRODUCTION INCREASE—
PROPORTIONATE COST REDUCTION IN SMALL PARTS
MACHINING!



CLAUSING SEMI-AUTOMATIC BORING AND TURNING MACHINE 4 MODELS—ONE TO MEET YOUR EXACT NEEDS

Users report production increases of 200% to 500%, with corresponding cost reduction, and jobs have been held to .0002 tolerance on production runs. Average job change and set-up takes from 15 to 30 minutes. No special jigs or fixtures required . . . simple block tool holders, carbide insert bits and standard boring bars will handle most jobs. Operator merely loads, presses starter button, and unloads finished pieces seconds later . . . machining operations are performed automatically . . . simultaneously or in continuous sequence. A time and money saver on short as well as long production runs.

SPECIFICATIONS: $5'' \times 16''$ cross slide with 4-11/16'' swing, 5'' travel; $12'' \times 14''$ table with 9'' swing, 8'' travel. Prices start at \$4250 with electricals and hydraulic equipment installed.



CLAUSING DIVISION

ATLAS PRESS COMPANY

10-110 N. Pitcher St.-Kalamazoo, Mich.

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more power at the cutter!

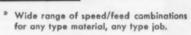
GREAVE 2-XH Milling Machines

The completely new GREAVES No. 2-X H Milling Machine brings added versatility, increased operational ease, and more power where it's needed most . . . at the cutter! It utilizes two motors, one for spindle drive; a separate motor for moving table, saddle and knee. Compare this and the other outstanding features of the new Greaves Mill. You'll see why Greaves is "The MOST Mill for the LEAST Money."

Write for detailed literature!



J. A. FAY & EGAN COMPANY 2700 Eastern Avenue, Cincinnati 2, Ohio



PLAIN AND

UNIVERSAL

MODELS

- Heavy, internally ribbed column casting and heavy duty rectangular overarm for maximum rigidity.
- * Large, heavy-duty knee, saddle and table provide accuracy for all types of milling.
- * New 71/2 HP spindle drive motor, with separate motor for movable components, provides extra power for heavy milling.
- Easy-to-reach controls. Handwheels and vertical crank disengage automatically when not in use.
- New rapid traverse lever within operating control area.
- Separate drive motor for table, saddle and knee provides more smooth balanced power at the cutter.

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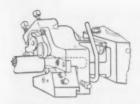
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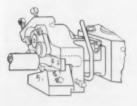
PROPER TOOLS mean a more PROFITABLE JOB!



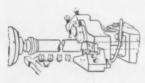
WITH THIS WARNER & SWASEY
SINGLE CUTTER TURNER YOU CAN
BOOST PRODUCTION ON WORK LIKE THIS!



1. TURN CONCENTRIC DIAMETERS — rolls ahead of the cutter ride on previously turned diameter, producing accurate size, perfect concentricity.



2. FINISH TURN TO SIZE in one pass with a deep cut and heavy feed. Rolls behind the cufter burnish the work to a fine finish.



3. SINGLE CUTTER TURNER
AS A STEADY REST for
heavy forming cuts
from the square turret
– cutter is withdrawn
and anti-friction rolls
support work close to
the cut.

Production was doubled, and a grinding operation eliminated, when a Warner & Swasey Single Cutter Turner was used to machine a worm gear shaft made from AISI-A4140 steel.

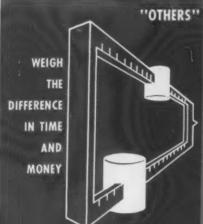
With this versatile tool you can set up and turn to within ± .001 in less than 10 minutes.

It's another example of the cost-cutting advantages offered you through the proper use of Warner & Swasey's wide line of almost 600 turret lathe tools!



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY

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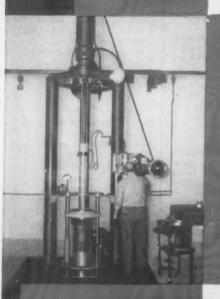
"OTHERS" . . . 16 HOURS . . .

slow . . . fantastically costly

FULMER HONING ONLY 3/4 HOUR.

fast ... money-saving

96% SAVINGS
ON FULMER
HONING MACHINES



Replace conventional, "oldfashioned" bore-finishing with FULMER PRECISION HONING. SAVE TIME AND MONEY ON EVERY OPERATION!

And Fulmer Honing is amazingly accurate as well as fast! Round and straight bores with maximum accuracy . . . lightning fast stock removal up to 1/1/2" at 1 1/2 cu. inches or more, per minute, with chips as long as 6 inches. Investigate! Send prints or workpiece sample and we will gladly estimate time and honing costs to show the possible savings to you.

C. Allen Fulmer Co., Dept. S, 207 F. 4th St., Cincinnati 2, O.



the world's best honing equipment

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modern machine shop

October, 1957

SAVE apto 60%

on Dies, Templates, Gauges, and Cams
with OLIVER DIE MAKING MACHINES

It's a fact!... Oliver Die Making Machines have virtually obsoleted the old, time-consuming "drill and chip" method of making dies and similar tools. The Oliver-originated principle of sawing out dies has resulted in greater speed, finer accuracy and up to 60% savings in costs. Further, the "Oliver" is so simple to operate that all sawing, filing and lapping can be handled by an ordinary mechanic... thus permitting the better utilization of a skilled die maker's more costly time. Ask about Oliver today!

Available in 5 Low-Cost Models

You'll find, whatever your die making requirements, that Oliver offers the machine you need . . . Bench Types S4 and S1, Pedestal Types SP-2 and SP-1 and the outstanding Heavy Duty Model. Why wait? You'll more than pay for your "Oliver" in die cost savings glone.



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Write today for information

OLIVER OF ADRIAN

1430 E. Maumee St. . Adrian, Michigan



Heavy Duty Model

	SPECI	FICATIONS	777
	S-4 Bench Model*	S-1 Bench Model*	Heavy Duty Model
Capacity	Saws to center of 17" circle on steel up to 1" thick	Saws to center of 17" circle on steel up to 1" thick	Saws to center of 20" circle on steel up to 3" thick
Table	111/4 " diameter	111/4" diameter	18" diameter
Tilt	10° to right, left or front	10° to right, left or front	15° to right, left or front
Strokes per min.	313 & 428	400	100, 125, 175, 215, 250, 300
Length of Stroke	13/6"	13/6"	0" to 5"
D .	37.3 %	P.1 .	*** *

This is why you should specify

Ask for detailed specifications and prices on Pope Deep Hole Spindles. You can use them with confidence.

precision spindles

Only POPE Deep Hole Spindles are equipped with double row, cylindrical roller bearings, permanently preloaded by the taper bore in the bearings which are close to the wheel for extra rigidity.

Pope deep hole spindles produce:

- more holes per day because they
- · better finished ground holes because of their shaft and bearing con-struction plus Pope precision crafts-
- dynamic balance all rotating parts are dynamically balanced in full assembly to assure smooth running and good grinding
- Pape system lubrication the bearings permanently lubricated for their entire operating life

POPE P12003-G

Belt Driven Deep Hole Spindle with 26" barrel length

POPE P-18840-A

71/2 - 71/2 HP. 900-1800 RPM Motorized Deep Hole Spindle with 50" barrel length

POPE P-5593 Bell Driven Deep Hole Spindle with 56" barrel length

POPE P-5886

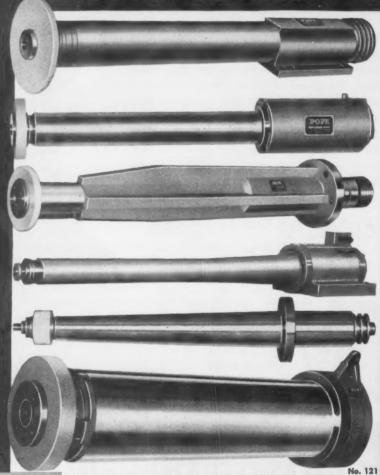
5 HP, 3600 RPM Motorized Deep Hole Spindle with 56 barrel length

POPE P-16022

Belt Driven Deep Hole Spindle with 36" barrel length

POPE P-7612

5 HP, 1800 RPM Motorized Deep Hole Spindle with 40" barrel length 10" barrel diameter





ENGINEERS AND BUILDS STANDARD AND SPECIAL PRECISION ANTI-FRICTION BEARING SPINDLES FOR EVERY PURPOSE

POPE MACHINERY CORPORATION . 261 RIVER STREET . HAVERHILL, MASS.



to use a cutting torch

but YOU can use a Buckeye Air Tool!

Cutting irregular shapes in metal can be a very difficult job that requires a cutting torch, or at best, a whole series of drilled holes, plus some grinding and filing. On the other hand, you can clean up the job with neatness and dispatch by simply using a Buckeye air-powered nibbler. This tool makes a sharp, clean cut, free from distortion, in sheet metal, steel, plastics, etc. Starts anywhere on the workpiece, goes anywhere you want it to, even in corrugated material or tubing as small as 1½" diameter. Catalog A-10 tells all; write for your copy.



Why AIR Tools?

Because air is everywhere, just waiting to be put to work ... because continuous operation can't possibly harm an air tool ... and because, using Buckeye air tools, you can almost forget about tool maintenance.

In Air Tools, Your Best Buy Is Buckeye Buckeye Tools

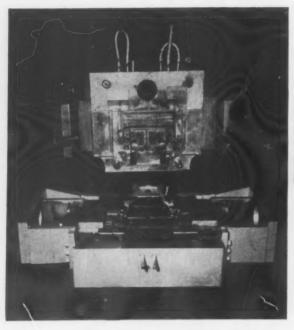
DIVISION 17 . DAYTON 1, OHIO

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October, 1957

modern machine shop

31



No matter what your DIE-CASTING may be ...

Accuracy calls for **POTOMAC M Hot Work Die Steel**



Write for BLUE SHEET on POTOMAC M

This concise four-page folder gives all needed handling and shop treat-ment details on Potomac M. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, bardening, tempering, etc. Ask for your capy.

ADDRESS DEPT. MS-94

In the precision casting of aluminum, POTOMAC M Hot-Work Die Steel is especially favored as the material for die-casting dies because its properties help assure accuracy of the steel itself after heat treatment. Die makers have found that size changes are held to a minimum. Dimensional stability is thus the first contribution that POTO-MAC M makes to accuracy.

Production accuracy of the die after it is in service is maintained also by the resistance of POTOMAC M to wear, to heat checking, and to metal wash.

Allegheny Ludium makes a complete line of steels for hot-work tooling of various kinds-so, whether your need is the mass producing of duplicate parts or fabricating a few of them, call up or write "A-L" every time for hot-work counsel or service or both. Just tell us your requirements.

· Allegbeny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For nearest representative, consult Yellow Section of your telephone book.

For complete MODERN Tooling, call Allegheny Ludlum



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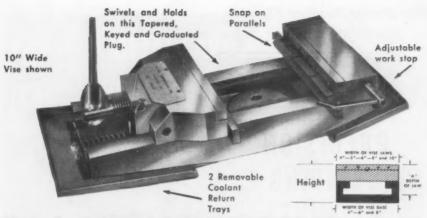
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The only HARDENED & GROUND SWIVEL MILLING MACHINE VISE

No Pedestal

OPERATOR WILL NOT HAMMER HANDLE

The J&S CLAMPCUT Milling Vise multiplies the clamping and holding power expected of a milling machine vise. The adjustable jaw head and positive down-holding clamping action gives multiplied pressure.

VERSATILE

- Holds out of square and out of parallel rough work pieces
- Adjustable VEE for holding rounds
- Rough work is held vertically

ACCURATE

- · Powerful vise allows high accuracy for repetitive positioning
- Adjustable features permit faster better machining
- Mill .0005" parallel, or better

FASTER, EASIER TO OPERATE

- · Larger opening
- Adjustable and deburring snap-on parallels
- Trigger opening and closing
- Coolant return trays
- · Half the weight of standard vises, yet has twice the opening

Distributors in Principal Cities



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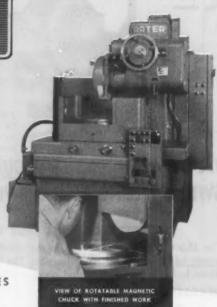
For Better Surface Finishes...
It's Smarter to use...



PRECISION GRINDING MACHINES

MODEL E HYDRAULIC ROTARY SURFACE GRINDER

PRODUCTION GRINDING
THAT ALWAYS RESULTS
IN MICRO-PLANE FINISHES



The complete line of Arter Precision Grinding Machines is designed and engineered to provide remarkably accurate, micro-plane surface finishes. These uniformly consistent finishes result in a minimum of grinding operations . . . avoiding time-consuming extra finishing that makes production costs soar.

The superiority of Arter micro-plane finishes is a result of the grinding method. All grinding is done on the peripheral or outer edge of the wheel while the work is held on a rotating electro-magnetic chuck. The grinding wheel touches the work at only one spot resulting in an extremely fine, concentric finish. It's just

the right touch for surfaces so uniform that, in many cases, they seal without lapping.

Accuracy and versatility are an inherent part of all Arter Machine Grinders. Each machine features rigid, vibration-free construction... hydraulic controls... variable stepless speeds for both chuck and wheel slide traverse... manual and automatic feeds... adjustable work tables for concave or convex grinding... convenient push-button control panel and compact design.

Arter Grinders are available in chuck sizes ranging from 8" to 40". Whatever your grinding requirements, you'll find it smarter to use Arter.

FOR DETAILED

on any machine, call your Arter representative or write for free brochures.

ARTER GRINDING MACHINE COMPANY

Manufacturers of Rotary Surface, Internal, External Grinders and Jigmatic Positioning Tables. 15 SAGAMORE ROAD, WORCESTER 5, MASSACHUSETTS

For more data circle 335 on Reader Service Card

34 modern machine shop

October, 1957

Any time your parts require machining more than one hole-drill, bore, face or tap-it may well be a



ARMSTRONG-BLUM MFG. CO.

MARVELSAWS

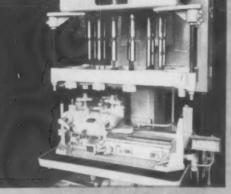
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October, 1957

modern machine shop

Natco Naturals

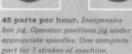
Cost-Cutting Ways You Can Use Standard Multi-Spindle Natcos Any time your parts require machining more than one hole-drill, bore, face or tap-it may well be a "Natco Natural." Your standard Natco will produce substantial savings in a surprising number of situations, even in small job-shop lots! Call in your nearby Natco field engineer; he'll tell you in short order whether you've got a "Natco Natural" there.



Multiple Drilling Operations on One Part-Face

Straight-line indexing on a Natco H6 produces
49 parts per hour. 4 holes drilled in first position, 3 holes
drilled in second position, 4 holes c'bored in third position.
One part completed every three strokes. Automatic
cycling frees operator for other work. Illustrations below show
three other ways of handling this part.

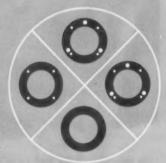








under fixture. Operator shifts parts
plete after each stroke. One part
completed every stroke.



185 parts per hour. Rotary 4-position index table. Operator unloads and loads while three operations proceed. One part completed every stroke.



Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 25 hp machines with up to 72 spindles. Spindles in standard Natcos are driven through universal joints and located by either adjustable arms or bored slip plates.



National Automatic Tool Company, Inc.

Richmond, Indiana

Multi-spindle drilling, boring, facing & tapping machines. Special machines for automatic production.

Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.

For more data circle 337 on Reader Service Card

<u>Bridgebort</u>

As modern as tomorrow . . .



Further facts available through your nearest dealer or through us direct.

Head only

Bridgebort MACHINES, INC. Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

For more data circle 338 on Reader Service Card

57

New DoALL Power Saw Increases Savings Possible with "SLUGGING"



User reports DoALL CUT-OFF Saw cuts 9 times faster than hacksaws!

A Cleveland manufacturer of bolt tension calibrators, The Skidmore Wilhelm Manufacturing Company, writes: ". . . We had two reciprocating hacksaws, one automatic and one manual, but they simply could not keep up with the chuckers, even though we were often sawing twenty-four hours a day. We then purchased one Model C-58 DoALL Power Saw. Even though we have added a third automatic chucker, this DoALL saw, operating on a one-shift basis, keeps all three machines supplied with slugs."

Slugging means profits for a young

expanding manufacturer. Faced with the problem of increasing production on alloy steel parts, the company swung to slugging. Teaming the DoALL C-58 Power Saw with a battery of chucking machines saves them money many ways. No huge expensive bar machines are required. Cut-off operations do not tie up the turning operations. The savings from the narrow kerf of the saw band pays for the power saw. And inventory and stock control are reduced to a minimum by cutting blanks only as required.

The DoALL Company . Des Plaines, Ill.

DoALL ... FIRST in material savings!

Typical slugging job: The cost of material lost in chips when cutting off 480 slugs of 5" dia. C.R. steel. (Material 12c per pound.)

8" Cold Saw.....\$81.40 Bar machine cut-off

tool 68.30 12" Power Hacksaw. . 40.70 DoALL Model C-58 Only 20.35















MACHINE TOOLSCUTTING TOOLS

INSTRUMENTS

SHOP SUPPLIES

Visit our Booth No. 360 Metals Show, Chicago, Nov. 4-8

For more data circle 339 on Reader Service Card modern machine shop

October, 1957

"What, immediate shipment?"

"Well, practically immediate!"



FERRACUTE O.B.I. PRESSES

32-ton 43-ton 56-ton

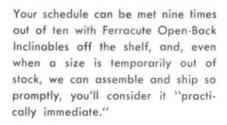
70-ton 88-ton 110-ton

150-ton 200-ton

All with newest Ferracute refinements including air-oper-

ated electrically controlled interconnected clutch and brake.

Box-type ram construction on 110 Ton, 150 Ton and 200 Ton.



Wire or phone for list of presses immediately available.

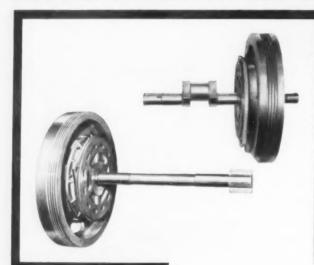
FERRACUTE MACHINE COMPANY

Since 1863, Manufacturers of Power Presses, Press Brakes and Special Machinery 489 East Commerce Street, Bridgeton, N. J.

For more data circle 340 on Reader Service Card

TO INCREASE PRESS EFFICIENCY

MINSTER. CLUTCHES FOR PRESS CONVERSIONS



Combination Clutch and Brake unit mounted on crankshaft within flywheel as supplied for flywheel type gap or straight side presses.

MINSTER Combination Air Friction Clutch and Brake — made by a press manufacturer who knows your problems.

Combination Friction Clutch and Brake unit mounted on drive shaft within flywheel for geared presses.

Here's why it is profitable to convert to Minster Clutches:

- Eliminates down time because of clutch failure
- Reduces maintenance by eliminating costly and frequent parts replacement
- Increases die life because of smooth, shock-free clutch engagement
- Reduces operator fatigue and improves safety because press is easier to operate, easier to control
- More productive cycles per hour on single cycle operation
- · Easier, more rapid die setting

Investigate the advantages of the Minster patented Combination Air Friction Clutch and Brake if you are considering modernizing your machines. Naturally, a new clutch unit will not make a new machine out of your old press. However, if your equipment is in good condition, or can be reconditioned reasonably, a Minster Clutch is the most profitable way for you to increase efficiency.

Ready to install: Minster conversion units are standard clutches, individually applied to your press. You receive the unit engineered to fit your press, complete with new flywheel and shaft as needed, ready to drop into place. This eliminates costly remachining and reworking of parts, saves down time for converting. A wide selection of Minster built electrical control systems is available.

Bulletin CC 57 describes Minster Clutches for press conversion. Copy by request on company letterhead.

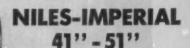
THE MINSTER MACHINE COMPANY

For more data circle 341 on Reader Service Card

UNI

OUTSTANDING NEW MACHINERY...

AT LOWER COST!



VERTICAL TURRET LATHE 30 H.P. MOTOR \$24,985.

VISIT US IN BOOTH No. 1505 AT THE METAL SHOW

Liberal Terms -Rentals

A few exclusive territories still open to dealers.

PELS **BK-16**

COMBINED **PUNCH, SHEARS** CROPPER & NOTCHER \$5975.00.

UNUSUAL . . . 3 YEAR GUARANTEE

AARON 45 Crosby St., N. Y. 12, N. Y. Branches at MACHINERY CO., INC. WAlker 5-8300

Dept. M

SEE PAGE 61

Buffalo, N. Y. Mineola, N. Y. Los Angeles, Calif. Richmond, Calif.



These Verson Power Press Brakes are furnished from stock



\$2630*

is the full price of this Verson quality press brake, designed and built for top performance. 16 ga. x 78" capacity.



\$1600*

will put this power press brake to work in your shop in a matter of days. Capacity is 16 ga. x 48" of mild steel.

Large shop . . . small shop . . . here are economical answers to a wide variety of bending jobs in any shop. Models 1062 and 16-48 are standard Verson Press Brakes available from stock without the annoyance of involved proposals or long delays in delivery.

Here's the chance to put famous Verson all steel construction and proved-in-service Verson design to work for you . . . at a price so attractive, it's hard to believe. Write for complete specifications or if you prefer . . . place your order NOW!

*Prices F.O.B. Chicago, less dies; subject to change without notice.

A Verson Press for every job from 60 tons up.

164

-Verson

ORIGINATORS AND PIONEERS OF ALLSTEEL STAMPING PRESS CONSTRUCTION

ERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Avenue, Chicago 19, Illinois 8300 S. Central Expressway, Dallas, Texas

For more data circle 343 on Reader Service Card

modern machine shop

October, 1957



For more data circle 344 onReader Service Card

SETTING

PRODUCTION RECORDS

for large hole tapping!

"TAP KING"

You'll marvel at the speed, power and precision at your finger tips when you operate this remarkable tapping unit. Designed specifically for large hole tapping, in heavy materials, it has repeatedly demonstrated its superiority on many difficult jobs. Here are just a few samples of the kind of work you can expect with the Tap King: "on open hole tapping in carbon steel forgings—production increased 50%"—"on blind tapping in steel castings—production up 100%"—"tapping in 1½" steel plate—a class 2 fit was maintained with ease". The Tap King assures you better finished parts, less spoilage, fewer broken taps, faster, easier operation and greater production. Discover how far you can go in improving **your** tapping operations and reducing costs.



Write for FREE brochure

giving you full details and specifications on this amazing unit.

PROCUNIER SAFETY CHUCK CO.

12 S. Clinton St., Dept. 10, Chicago 6, III.

Gentlemen:

Please send your Free Illustrated Brochure

Name...

Address

City.....Zone....State...

TAP KING

EXCLUSIVE

tru-grip tap holder

smaller, lighter,
permits tapping
close to walls and
shoulders.

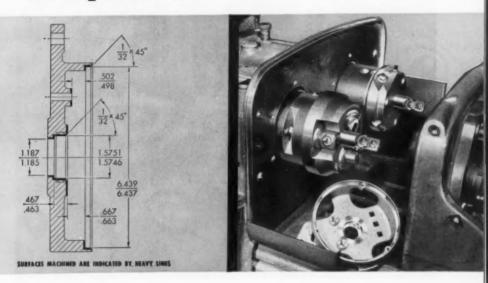
PROCUNIER Safety Chuck Company

12 S. Clinton Street ● Chicago 6, Illinois

For more data circle 345 on Reader Service Card

NEW heavy duty

9 surfaces rough and finish machined in 2 passes...



HOW MICROBORE CLUSTER TOOLING DOES IT ON A PRECISION BORING MACHINE!

Special Microbore Cluster Tooling makes it possible for a leading electrical equipment manufacturer to obtain a continuous flow of finished parts by rough and finish machining, simultaneously, nine surfaces on a generator end bell casting in two passes.

SET-UP TIME IS FASTER, TOO-Independent, precision adjustment of each tool point permits accurate settings in a matter of seconds. Speed and accuracy of adjustment, plus compactness of Microbore units, makes

cluster tooling practical to a degree formerly considered impossible.

Microbore is a versatile tool with unlimited application for all types of boring, turning and facing operations. Microbore Standard

Boring Bars, Boring Bar Sets and Flash-Change tooling complete the perfect combination for accurate, quick change tooling.

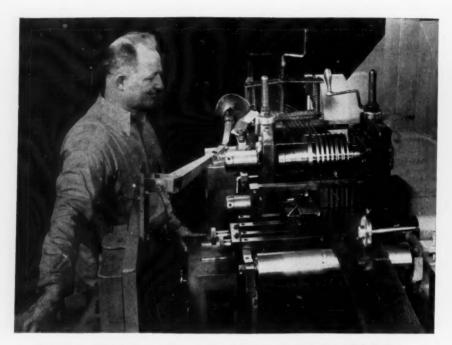


eTo find out how Microbore can help you, write for our new catalog No. 58.

DEVLIEG MICROBORE SYSTEM

DEVLIEG MICROBORE . DIVISION OF DEVLIEG MACHINE COMPANY

For more data circle 346 on Reader Service Card



Yoder Slitters Supply Varied Strip Widths for Tinnerman Speed Nuts*

Tinnerman Products, Inc., Cleveland, Ohio, produces more than 10,000 different shapes and sizes of "SPEED NUT" brand fasteners for industry...many of them to special specifications,

To do this, Tinnerman uses slit steel strands ranging in width from $\frac{1}{2}$ to $\frac{1}{2}$. To carry an inventory of the many strip widths required to meet normal and unusual demands would be almost impossible.

Tinnerman overcomes these inventory and supply problems by doing their own slitting on two Yoder slitters. This enables them to supply the plant with any strip size required from a relatively small inventory of 6" and 9" width purchased coils. In slitting narrow strands, such as these from small coils, a Yoder slitter may be profitable on a production as low as 25 tons per month.

Here is a fine example of how a small investment in Yoder slitting equipment greatly simplifies and speeds production while effecting important operating economies.

The saving made in time alone, reflects in better customer service through faster completion and delivery of finished products.

If your steel strip or sheet slitting requirements are as low as 100 tons per month or even less, a medium size Yoder slitter can be a very profitable investment for you. The Yoder line includes units of every size and capacity... of the most advanced engineering design. Send for the Yoder Slitter Book—a comprehensive text on the mechanics and economics of slitters and slitting line operation, with time studies, cost analyses and other valuable data. Write to:

THE YODER COMPANY . 5532 Walworth Ave., Cleveland 2, Ohio



ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES

For more data circle 347 on Reader Service Card

modern machine shop

October, 1957

in 21 colum

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NOW..



sizes to

choose from!

CINCINNA

SLIDING HEAD DRILLS

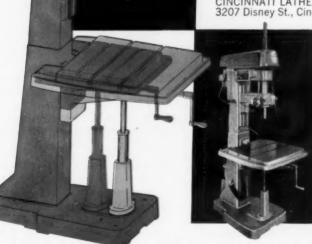
21/25 Heavy Duty Floor Drills in 21" and NEW 25" sizes. Box column in single and multiple spindles, round column in single spindle only. Standard speed range 75 to 1530 rpm. 11/2" drilling capacity.

Greater throat capacity has been added to Cincinnati's industry-proven 16" and 21" Sliding Head Drills . . . the 16/24 Medium Duty Drills are built in both the familiar 16" and the NEW 24" sizes, the 21/25 Heavy Duty models in 21" and 25".

All of the proven features are in all four sizes-geared power feeds, positive stop and automatic feed disengage, sturdy box construction, and many others-giving you the ease of operation, high accuracy and stability of drilling machines that cost far more.

Investigate how you can speed up and improve your drilling operations with these new Cincinnati Sliding Head Drills. See them and get all the facts at your local CL&T Dealer. Or, write direct.

CINCINNATI LATHE AND TOOL CO .. 3207 Disney St., Cincinnati 9, Ohio.



16/24 Medium Duty Drills in 16" and NEW 24" sizes. Bench and floor models, single and multiple spindle. Standard speed range 390 to 3100 rpm, 1" drilling capacity, 24" size has new larger work table.



- center on cincinnati lathes and drills

ENGINE, TOOLROOM, TRACER AND FIXED GAP BED LATHES AND A COMPLETE LINE OF DRILLING MACHINES For more data circle 348 on Reader Service Card





Tighten just 4 bolts and R-200 is mounted on any vertical miller! It combines all the extreme sensitivity of true fluid motion with the extra rigidity of its base-casting-mounted follower arm.

Single lever control enables inexperienced operators to produce intricate contoured parts. Rugged adjustable friction brake. Table "floats" on ball-bearings in circular raceways.



For more data circle 349 on Reader Service Card

Meetings

EN(

Important Meeting

Dates

October 13-17 • Pressed Metal Institute, Annual Meeting, Castle Harbor, Bermuda. Institute head-quarters: 3673 Lee Rd., Cleveland 20, Ohio.

October 21-25 • National Safety Council, Congress and Exposition, Conrad Hilton Hotel, Chicago. Council headquarters: 425 Michigan Ave., Chicago 11, Illinois.

October 22-25 • National Machine Tool Builders' Association, Annual Meeting, Sheraton, French Lick Springs, Ind. Association headquarters: 2071 E. 102nd St., Cleveland 6, Ohio.

October 27-30 • American Gear Manufacturers Association, Fall Meeting, Edgewater Beach Hotel, Chicago. Association headquarters: 1 Thomas Circle, Washington 5, D. C.

October 31-November 3 • National Tool & Die Manufacturers Association, Annual Meeting, Edgewater Beach Hotel, Chicago. Association headquarters: 907 Public Square Bldg., Cleveland 13, Ohio.

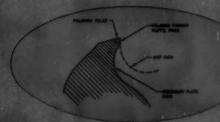
November 2-8 • American Society for Metals, Annual Meeting and Exposition, Palmer House and International Amphitheatre, Chicago. Society headquarters: 7301 Euclid Ave., Cleveland 3, Ohio.

NEW!

WELDON Thi-Kut END MILLS



FOR CUTTING ALUMINUM



CUTTING ALUMINUM MADE EASIER, SMOOTHER AND FASTER

The primary flute face of the Ski-Kut End Mills, being narrow, definitely minimizes adherence of chips to the flute faces. Adherence or welding of aluminum chips contributes in a major degree to the difficulty in milling aluminum.

Greater feeds, longer tool life, better finish, easier operation of equipment are some of the advantages to be gained by the use of Weldon Ski-Kut End Mills for cutting aluminum.

A RADICALLY NEW DEVELOPMENT IN END MILL DESIGN FOR CUTTING ALUMINUM THAT SPEEDS PRODUCTION AND REDUCES COST.

- Minimizes adherence of Chips
 to Flute Faces
- 2. Increased Shearing Action(45° Helix Angle)
- 3. Hammering Effect Practically Eliminated
- 4. Greater Feeds
- 5. Longer Tool Life
- 6. Better Finish
- 7. Easier Operation
- 8. Less Horsepower Required

Wolden SKI-KUT End Mills are available from stock in size from 1/4"
to 2" in various lengths. For full information write for folder SKM-1
Wellen Distributes throughout U.S.A. and Consider carry complete electes to serve you.

THE WELDON TOOL COMPANY

W-100













CLEVELAND 4 OHIO



The "RIGHT COMBINATION" for every reinforced grinding wheel

... because Norton builds the "Touch of Gold" into it

For every grinding, cutting-off or slotting job where you need a reinforced wheel, there's one Norton wheel that will do it best.

Norton helps you make more money by supplying a complete line of reinforced wheels. You get the size, the abrasive, the reinforcing web and the rubber or resinoid bond best suited to the work. Such a wheel puts the "Touch of Gold" in your hands for better production at lower costs.

. . . because Norton builds in Strength and Safety

These pages can't begin to show the many combinations to be found in Norton Reinforced Wheels, mounted wheels and points and sticks.

Norton makes so many varieties you can enjoy the just-right combination you're after. This "combination" lets you work fastest . . . safest . . . and most profitably. It's your advantage in dealing with the world's largest supplier of abrasives.

Also, Reinforced Mounted Wheels and Sticks

See your Norton distributor for further facts about reinforced abrasive products. Ask him for Booklet No. 1748. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.







NORTON

ABRASIVES

Making better products ... to make your products better

NORTON PRODUCTS

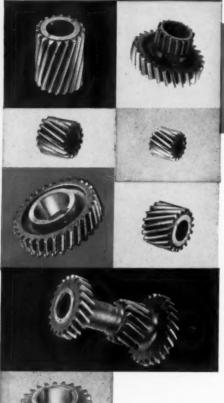
Abrasives · Grinding Wheels · Grinding Machines Refractories

BEHR-MANNING DIVISION: Coated Abrasives . Sharpening Stones Behr-cat Tapes

W-1810 For more data circle 352 on Reader Service Card



GEAR TOOTH NICKS and "HICKIES"



HONING IS THE LOW-COST WAY OF SILENCING THEM

You can hone the average automotive transmission gear in from 15 to 60 seconds. This single operation gets rid of all the noisy nicks and hickies that are so troublesome and tedious to deal with in any other way.

But that's not all. Red Ring honing also improves over-all surface finish—down to 2-4 microinches if necessary.

The initial pass under the honing tool is an effective inspection procedure in that it immediately reveals any distortions that may exist in tooth profile, spacing and pitch diameter runout. When such distortions are not excessive, honing corrects them.

If you want to reduce the cost of silencing noisy gears (1" to 12" PD), write for Bulletin H 57-2.

SPUR AND HELICAL GEAR SPECIALISTS ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

7850

NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

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modern machine shop

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The Robert W. Walker Company, 730 South Western Ave., Los Angeles 5, Calif., DUnkirk 7-4388, 57 Post St., San Francisco 4, Calif., SUtter 1-5568. California, Oregon, Washington.

* * * *

modern machine shop 431 Main St. Cincinnati 2, Ohio

STANDARD BROACHES

all from stock!



Minute Man KEYWAY BROACH KIT

In one minute and for as little as one cent you can cut a keyway with this kit. For keyways from $\frac{1}{16}$ to $\frac{1}{16}$ in any bore from $\frac{1}{16}$ to $\frac{3}{16}$.

Minute Man

SQUARE BROACHES

HEXAGON BROACHES

1/8" to 3/4" squares and hex's; 1/4" to 1" round. Production Type Keyway Broaches also in stock.

New ROUND BROACHES

The duMONT CORPORATION Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to Name

Company.

Address.

For more data circle 354 on Reader Service Card





Motor mounted behind column balances weight of head, minimizes deflection.

ISOLATION OF MOTOR VIBRATION



Column acts as baffle, keeping motor vibration away from head.

MORE EFFICIENT POWER TRANSMISSION



Wide belt spacing permits use of B-section V-belt, more wrap around on pulleys.



U.S.Vertical

MILLING MACHINE

The exclusive motor mount design of the U. S. Vertical provides balance, rigidity and greater milling ACCURACY! And, check these ADDED features — all designed to aid in close tolerance work.

- · Machine weighs 2000 lbs.
- · Massive knee, saddle and table
- · Extra wide bearing surfaces
- Tested and CERTIFIED ten ways
- Major castings are internally ribbed, normalized and stress relieved.
- · Dovetails are deep and hand scraped
- · Extra quill, knee, saddle and table travel

Write for your FREE copy of new U. S. Vertical Milling Machine Bulletin.

Builders of Milling Machines only

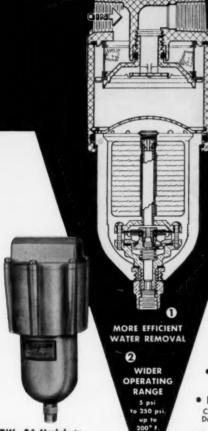
U*S*Burke

MACHINE TOOL DIVISION

3 Brotherton Road • Cincinnati 27, Ohio

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NEW Advanced design



Morgren

Automatic-drain

Air line filters

MORE EFFICIENT FILTRATION
OF COMPRESSED AIR

You Get These Important Advantages:

- More Efficient Water Removal
 Greatly increased water removal efficiency—even at air flows 143% higher than ever before.
- Operates Over Wider Pressure Range
 Top efficiency at as law as 5 psi for all models and as high as 250 psi for metal bowl type.
- Operates Over Wider Temperature Range
 New metal bowl models in ¼", ¾" and ½" sizes extend
 temperature range to 200° F.
- Withstand Rougher Usage
 Metal bowl models are ideal for applications likely to get rough usage.
- Simplified Drain Mechanism
 More efficient operation. Fewer parts.
- Eliminates Manual Draining
 Collected liquid is drained automatically—cannot return to air line.
 Drain operates as long as pressure is on the system.
- Choice of Three Filter Elements
 74, 64 or 25 micron elements—interchangeable.

Transparent Bowls—¼", ¾", ½",
 ¾", 1"

Metal Bowls - ¼", ¾", ¾",

NOW-24 Models to

choose from

Wherever Air is Used in Industry

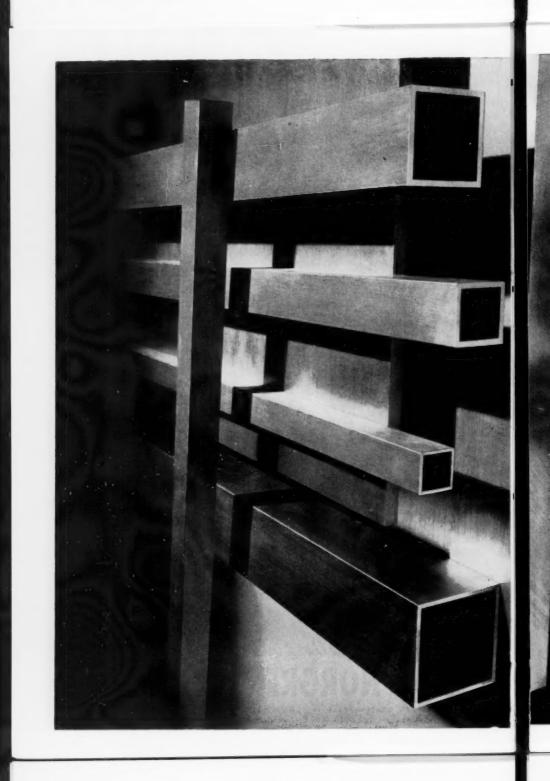
C. A. NORGREN CO.

3435 SOUTH FLATI STREET . ENGLEWOOD COLORADO

information,
call your
nearby Norgree representative
listed in your telephone
directory—

OR WRITE FACTORY FOR NEW NO. 800 CATALOG

For more data circle 356 on Reader Service Card





Try this new square magnesium tubing

Now-from your Dow magnesium distributor-square extruded tubing for easier construction of jigs, fixtures, platforms and dollies

Square magnesium tubing combines light weight with strength, rigidity and dimensional stability. Used with magnesium tooling plate, it permits simplicity of design and construction of assembly jigs, testing fixtures and stands, movable platforms, dollies and many other tooling applications.

The square shape offers large areas of contact between members for added strength, provides flat work surfaces.

It's easier to weld, easier to cut and fit, easier to assemble—will save you time and effort in both construction and in use. Square extruded magnesium tubing, as well as magnesium tooling plate, is available from stock through the Dow magnesium distributors listed below. Contact the one nearest you next time you have an application for a light, strong, easy-to-fabricate tooling material. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 1420V.

AVAILABLE FROM STOCK AT: Copper and Brass Sales, Inc., Detroit, Michigan • Fullerton Steel and Wire Co., Chicago, Ill., Hubbell Metals Inc., St. Louis, Mo. • A. R. Purdy Co., Inc., Lyndhurst, N. J. • Reliance Magnesium Co., Los Angeles, Calif.

YOU CAN DEPEND ON

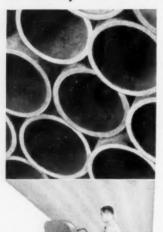




Abrasive Cutting Know-How

Know-How is just as vital to top performance in abrasive cutting as in any other machine tool operation

For Thin-Wall or Heavy-Wall Tube Cutting You Can IMPROVE QUALITY and PRODUCTION...CUT COSTS with Any One of Several Models of Campbell Machines



 You can confidently expect the sort of tubecutting performance pictured here when a CAMP-BELL Abrasive Cutting Engineer prescribes the CAMPBELL Machine Model best suited to cut YOUR costs.

QUALITY CUTS • No burn...absolute minimum burr to reduce or eliminate deburring operations ... no distortion of tubing.

FAST CUTS • Wet cuts, for highest quality, at the rate of 6 to 10 seconds per square inch of metal...dry cuts at 2 to 5 seconds per square inch.

PRODUCTION • Operation of CAMPBELL Models ranges from manual or semi-automatic, to fully automatic for highest production rates.

VERSATILITY • CAMPBELL Abrasive Cutting Machines handle a wide range of shapes...channels, angles, solid rounds or squares...as well as tubing.

CAPACITY • There are 13 CAMPBELL Machine Models plus "specials." To fit your needs eleven of the "standard" machines provide tube-cutting capacities up to 14" O.D.

FOR EXAMPLE • The CAMPBELL Model #28 Severall is a low-priced, general utility, dry-cut machine. It cuts at the rate of 2 to 5 seconds per square inch of metal...will handle tubing up to 6" o.d., solids to 4", 6" angle iron and 8" channels.

This CAMPBELL Machine Model #223 cut the tubing pictured above. It handles up to 3½" tubing, 2" solids. Work clamps, work stop and coolant flow operate automatically.

CAMPBELL rotary machines cut tubing or solids up to 14" diameter with exceptional accuracy and wheel economy.



For further information write for the illustrated Bulletin DH-460-B

CAMPBELL MACHINE DIVISION • American Chain & Cable

931 Connecticut Avenue, Bridgeport 2, Connecticut

For more data circle 359 on Reader Service Card

ACCO

For fast, economical cutting of flat metal shapes there are MODELS Campbell Nibbling Machines

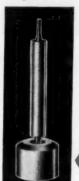
... with cutting capacities ranging from 3/32" mild steel for MODEL 0 machine to 1/2" mild steel for MODEL 530, in sheet sizes from 16" or less, to 72".

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and nonferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.





Economical "throw-away" punch and die



Send for this catalog for complete information on this versatile production and experimental tool

- CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.
 - ... for any and all kinds of shapes
 - ... for either inside or outside cuts
 - ... with no distortion of material-no internal strains
 -no invisible fractures-no burr
 - ...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of CAMPBELL NIBBLING MACHINE Capacities

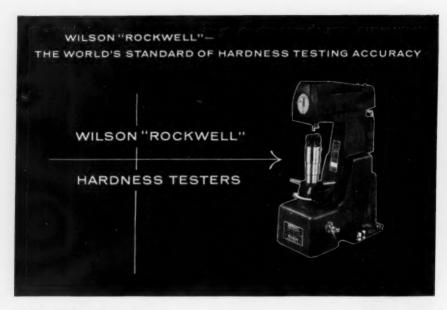
Campbell Nibbler Model#	Sheet Width	WORKING CAPACITY Sheet Thickness Mild Steel Alloy Steel	Strokes per Minute
0		3/32"1/16"	
		3/16"1/8"	
430	60"		.350-525
436	72"	3/8"1/4"	.350-525
530	60"	1/2"5/16"	.350-525
2524	48"	1/4"3/16"	.375-650
2536	72"	1/4"3/16"	.375-650

Campbell Machine Division AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Connecticut



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A FULL WILSON LINE TO MEET EVERY HARDNESS TESTING REQUIREMENT

> FULLY AUTOMATIC

SEMI-AUTOMATIC

REGULAR

SPECIAL

SUPERFICIAL

MICRO & MACRO HARDNESS TESTERS See the complete WILSON line at BOOTH No. 953

39th National Metal Exposition

NOVEMBER 4-8, 1957

International Amphitheatre

CHICAGO, ILLINOIS

Write for booklet DH-325 today



WILSON

AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N.Y.
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OUTSTANDING NEW MACHINERY... BEST VALUES IN THE U.S.A.



LARSON
Fine Precision Boring Machines
\$2,495.



KOLLE
Model K-16 Vertical Contour
Metal Cutting Bandsaw
\$1,495.



IMPERIAL
VERTICAL MILLING MACHINE
\$1,440.00

UNUSUAL 3 YEAR GUARANTEE

Starrett

Liberal Terms - Rentals

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BUFFALO, N. Y. - MINEOLA, N. Y. LOS ANGELES, CALIF. - RICHMOND, CALIF.

Branches at:

SEE PAGE 41

WAlker 5-8300



For the first time—on any milling machine **ELECTRONIC DYNA-DRIVE**

REGISTERED TRADE MARK

THE "TORQUE-THINKING" TABLE FEED

Yours EXCLUSIVELY with



GORTON

MASTERMIL

It "feels" as it feeds

• The exclusive Gorton Dyna-Drive® Table Feed unit "thinks while it works." It automatically adjusts to provide the exact amount of torque required. This electronic "brain" compensates during the cutting operation for small variation in density, hardness and molecular structure of the material being machined. Results are exceptionally fine finish and prolonged cutter life.

The Gorton Mastermil is precision-built throughout, simple, rugged with the finest milling head of any machine in its class. Ram adjusts in and out. Turret revolves and spindle swivels 90° left or right.

Learn more about this remarkable machine by writing for bulletin 2699-A-1710



GEORGE GORTON MACHINE CO.

1710 RACINE STREET

RACINE, WISCONSIN

Tracer-Controlled Pantographs, Duplicators—standard and special... Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

For more data circle 363 on Reader Service Card

A7-1003-1PA



LEBLOND-CARLSTEDT RAPID BORER

... the machine that produces deep holes 3 to 8 times faster

The manufacturers of this new concept in deep hole boring say that the Rapid Borer was developed expressly to accommodate revolutionary new tooling which drills, bores and trepans at high speed with accuracy, and gives excellent finish. Cutting oil is forced between the boring bar and wall of stock, forming a continuous bearing. The oil is forced back through a hollow boring bar, carrying away the chips as it goes. Tool faces are kept clean and chip passage clear. Chips do not come in contact with finished bore.

To insure the success of this operation, a special cutting oil with extreme pressure and excellent cooling characteristics was required. Shell Research went to work, and out came a new addition to the Shell family of cutting oils . . . Garia® Oil 115.

If you are interested in more technical information on Garia Oil 115, write Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

SHELL GARIA OIL 115

For more data circle 364 on Reader Service Card

f

Safety elevating nut protects both operator and machine

ONLY GILBERT RADIALS

OFFER ALL THESE FEATURES

Four-lever turnstile cuts machine handling time

Weight carried on opposed Timken bearings When you order a Cincinnati Gilbert radial, you get more new features per dollar than any other radial can offer. And every feature is designed to give you maximum return on your investment—in performance, productivity, and dependability.

Balanced arm resists torsion, compression, tension forces

Hardened column available

Direct-reading speed and feed shifters; gears counterbalanced for easy shifting Head rides on anti-friction bearings; clamps three surfaces

When disengaging positive feed clutch, spindle won't drop

Full spindle

support near took

runout is less

than .001"

Adjustable ball bearing rollers on hardened ring for maintained rigidity

Long heel

on heavy base

provides 360°

stability

And don't overlook these additional features:

- wide range of spindle speeds for efficient tool performance;
- hardened gears throughout the machine;
- standard or special tap leads available;modern styling which reduces housekeep-
- modern styling which reduces housekeeping, convinces customers that your shop is up-to-date.

Hardened tang slot is an exclusive Gilbert feature

Powerful, accurate electric column clamp available Write or call for Bulletin 349.

those who buy Gilbert buy Gilbert again

THE CINCINNATI GILBERT MACHINE TOOL CO. 3348 BEEKMAN STREET, CINCINNATI 23, OHIO You can always see the spindle; get extra use of spindle travel

For more data circle 365 on Reader Service Card

These Rubber-Cushioned,
MULTI-USE STOCK ABRASIVES
DO THE WORK OF SPECIALS....

GIVE A COMPLETELY NEW, WIDER CONCEPT OF ABRASIVE APPLICATIONS

Brightboy brings you something definitely different! A unique working action noteworthy for newness and versatility. Frequently reduces burring, finishing, cleaning, polishing, to a single-step operation.

cuts

Special formulation is responsible for Brightboy's exceptional adaptability. Abrasive grains and "cushioning" rubber are evenly dispersed throughout the compound. Abrasive and rubber work simultaneously.

STOCK NUMBERS, job matched to your regular and special requirements. Silicon Carbide and Aluminum Oxide grains, each from extra fine to extra coarse, in soft, firm and tough rubber binders.

Ask your dealer for Brightboy recommendations and for the Brightboy Catalog listing grains, textures, machine speeds, work suggestions. Write us if he cannot supply you or on any problem in which finishing is involved.

BRIGHTBOY INDUSTRIAL DIVISION WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.

America's Pioneer Manufacturer of Rubber-Bonded Abrasives





TIME-SAVING FEATURES

Works to close tolerances
Can be shaped to contour
Produces conventional and special finishes
and patterns, frequently the final polish
No before-use preparation or dressing
No skilled labor required

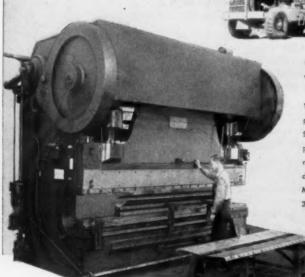
GENERAL USES

Removing light digs, tool and heat marks
Cleaning welded and soldered joints
Burring and finishing castings, stampings,
machined and molded parts
Maintenance of tools and machinery

For more data circle 366 on Reader Service Card



Speeded With
STEELWELD PRESSES



Caterpillar DW20 Tractor with W20 Wagon.

Tractor equipment parts produced on this and other Steelweld Presses at Caterpillar are of various thicknesses and require many different bends. This is a Model K5-10 Press rated at 320 tons.

T HE ease and speed with which dies can be changed on Steelweld Presses and necessary adjustments made have proven a big asset in obtaining high production of a great variety of steel parts for scrapers, rippers, bulldozer blades and wagons at the Joliet Plant of Caterpillar Tractor Co.

Because of simplicity of Steelweld operation, the parts can be turned out quickly and accurately. The heavy quality construction, including solid one-piece frame, finest electrical equipment and automatic oilers for lubrication of all bearings, keep Steelweld Press maintenance extremely low and assure uninterrupted production.



CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND GRANE & ENGINEERING CO. 6449 East 281 Street Wickliffe, Ohio



STEELWELD

BENDING PRESSES

BRAKING . FORMING . BLANKING . DRAWING . CORRUGATING . PUNCHING

For more data circle 367 on Reader Service Card

PARKER - MAJESTIC PM PRECISION MACHINES

PARKER SPINDLES FOR ANY MACHINE—FOR ALL APPLICATIONS



Following its development in 1915 and as a result of constant improvement through the years, the Parker Spindle has become one of the most widely used spindles in this country today on many makes of machines. The

demand for speed and endurance in grinding, precision boring and milling which the Parker Spindle makes possible has made Parker-Majestic Incorporated the leading manufacturer of precision spindles.

PARKER-MAJESTIC, INC.

147 Joseph Campau • Detroit 7, Michigan

INDUSTRY REPORTS ON





At North American Aviation, Columbus, O.

WALKER-TURNER RADIAL DRILLS IN CONSTANT USE FOR 6 YEARS—AND STILL GOING STRONG!

Two of these Walker-Turner radial drill presses are utilized in a unique production-line operation for making all router jigs in the Template Fabrication Department.

In this application, positioning holes are drilled in the jig on the first press. Then the work is passed to the second machine, where the operator drills or countersinks the holes as necessary. It's

a fast, efficient method for machining all sizes and shapes of router jigs, with a minimum of set-up time.

The Company has found the versatility, rugged construction, and low maintenance of these radial drill presses and other Walker-Turner "Light-Heavy-weights" also make them ideal for many tooling and production jobs in other departments.

NOW—A New W-T Radial DRILL PRESS That's Even Better!

With its all-new head assembly, this design offers all the ruggedness, versatility and efficiency of larger, expensive machine tools. Available in 24 models—4¼" or 6" spindle travel.

Ask your Walker-Turner distributor for a demonstration. He is listed under "Tools" in your telephone book. Or write for literature.



Division of Rockwell Manufacturing Company Dept WK-22, 400 N. Lexington Ave. Pittsburgh 8, Pa.





for facing all structural steel shapes, plates, forgings and castings

Here is a tabulation of average Mill-All cutting times on structural shapes. Depth of cut is ½", time is for one cut, except for plate facing where depth of cut is ½".

Type of Work	Time
4°-13 lb. B. S.	6 seconds
6"—12.5 I-Beam	8 seconds
24" x 12" x 100 lb. W. F. Beam	48 seconds
8" x 8" x 1" Angle	14 seconds
24" x 36" plate,	8 minutes

This versatile new machine achieves the highest production facing ever, at the lowest cost! Mill-All cuts up to 1,000% faster! It produces a finished surface that is better than most commercially-milled finishes.

The Mill-All is available in sizes to suit the largest structural fabrications, with 40 h.p. standard or 75 h.p. optional cutting capacity. Made of steel weldments with "ball bearing" feed screws. Horizontal and vertical ways covered with non-metallic facing.

Write for complete technical data contained in the new Kling Mill-All Bulletin.

Since 1892

Active Kling Distributors cover practically every marketing area of U.S. and Canada. Write us for name of one nearest you.



BROS. ENGINEERING WORKS

1320 N. KOSTNER AVE. • CHICAGO 51, ILLI NOIS
Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.
Expert Distributor: Simmons Machine Tool Corp., 50 E. 42nd Street, New York 17, N. Y.

Makers of Friction Saws; Shears, Rotary, Double Angle and Guillotine: Punches, Universal Beam and Single End Type; Combination Shear, Punch and Coper; Rolls, Angle and Plate Bending; Buildozers.

For more data circle 370 on Reader Service Card

the New Rockford Tracer Lathe ...

with hydraulic

KOPY



- KAT DUPLICATOR

in a tracer lathe. Forty years of building fine lathes and 25 years of hydraulic duplicating experience make an unequalled combination. Extreme accuracy of duplication, coupled with enough ruggedness to utilize the full horsepower of the machine, make Rockford Tracer lathes the preference for repetitive turning in any volume.

The Rockford Tracer lathe can be converted to a completely standard engine lathe in a matter of minutes, thus adding to its versatility and flexibility for small lot production. Complete interchangeability of multiple diameter work can be achieved by unskilled operators at production speeds comparable to turret lathes. These machines are rugged enough for heavy production work, yet flexible enough for tool room or job shop production.

Ask for bulletin No. 1002, or send us prints of your applications for free production estimate.

check these

PLUS FEATURES

Duplicating Attachment and Lathe built by same manufacturer. No Divided Responsibility.

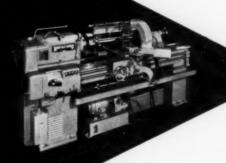
Kopy-Kat Valve precision manufactured with built-in retract.

Power Unit requires no added floor space.

Push Button Station combines and interlocks machine and electrical controls.

European Tool Post

Automatic Feed Cut-Out.



NEDIUM-SIZED Economy-priced

ROCKFORD MACHINE TOOL CO.

2500 KISHWAUKEE STREET . ROCKFORD, ILLINOIS

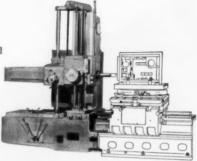
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Select
a Lucas
for accurate spacing
for precision boring
for heavy milling

Your choice of controls -

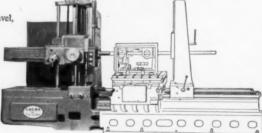
STANDARD LEVER CONTROLS

available for use with both short bed or backrest models.



FULL PENDANT CONTROL

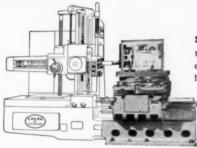
of feeds, speeds and directional travel, optional on any Lucas.



Whether you do line or stub boring, whether you prefer lever or automatic pendant control, you get the basic advantages of automatic power positioning and 4-way beds. Whichever model you select you get the benefit of continuing design improvement, backed by 57 years of specialization and leadership in this field plus the full resources of The New Britain Machine Company.

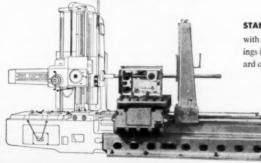
in production
in the tool room
in experimental work
in engineering research
in maintenance applications
or several, in combination

your choice of beds



SHORT BED MODELS

the most compact and economical equipment for precision stub boring, heavy milling and horizontal drilling.



STANDARD BED WITH BACKREST

with anti-friction bearing mounted bushings in backrest block, handles all standard operations including line boring.



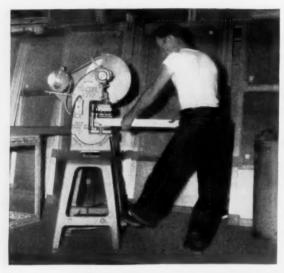
LUCAS MACHINE DIVISION

The New Britain Machine Company Cleveland, Ohio

OTHER NEW BRITAIN MACHINE TOOLS DIVISIONS

New Britain-Gridley Machine Division New Britain, Connecticut Hoern & Dilts Division Saginaw, Michigan

For more data circle 374 on Reader Service Card





D. A. CHALMERS, President Chalmers Inc., Melrose Park, Ill

"famco POWER PRESSES

give us trouble free operation...no down time."

Not one red cent spent for parts in two years . . . no downtime! And, they did it with Famco Power Presses.

That's the enviable record chalked up by Famco on-the-job at Chalmers Inc., manufacturer of anodized aluminum AIR SEAL windows and doors.

Notching Z bars, punching side rails and crimping inserts are but a few operations these presses handle efficiently, day-in and day-out at Chalmers.

Maybe you'd like lower operating costs, trouble free power press performance. If so, it will pay you to investigate the Famco Power Press line. Famco has over 50 different models to select from—bench or floor, standard or deep throat—in 4 to 18 ton capacity. And, *only* Famco offers 4 great clutch types for its presses.

Learn how Famco Power Presses can save you production time and money now! Write for FREE catalog.

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famco machine company

3122 SHERIDAN ROAD • KENOSHA 10, WISCONSIN
AIR PRESSES • ARBOR PRESSES • BAND SAWS • DRILL PRESSES • FOOT
PRESSES • POWER PRESSES • SQUARING SHEARS • MILLING MACHINES

For more data circle 375 on Reader Service Card



ELGIN DYMO-C* gives us the most uniform Superfinish"

Saus David Schreiber.

President, Master Carbide

Master Carbide received an order to make integrators for Ground Position Indicators-and with it a real problem. The integrators were intended for jet fighters, and involved welding together several materials with different coefficients of expansion. Rigid requirements included accuracy of perpendicularity, concentricity of diameters, and flatness (within one wavelength of light). Most important of all was a uniform superfinish from 0-1/2 micro-inches (R.M.S.). Trying various makes of diamond compound, Master Carbide decided on Elgin Dymo-C*. They found it gave the most uniform finish of all. Elgin Dymo-C* is accurately graded to insure absolute uniformity of particle size. Test it or ask your Elgin man to show you proof. Then-for the most uniform finish possible-specify ELGIN DYMO-C*.

*C for Carbide

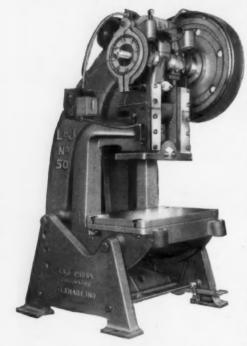
Abrasives Division **ELGIN NATIONAL**



ATCH COMPANY

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Write for Bulletin L-14
14 to 90 ton O.B.I. Presses, 20
to 50 ton Straight Side Presses.

EXTRA CAPACITY WITH PRECISION TO MATCH

Large area dies are no problem when you have an L&J No. 50 Series press with its extra capacity. The exceptionally heavy frame provides maximum rigidity which enables the flanged, box-type ram to maintain precision alignment for precision jobs. The large work area will permit you to run a greater variety of work. Its dependability and tooling ease provide a new high in press efficiency.

Available in geared and nongeared models. Air clutch is available. It will pay you to get complete details now.

SPECIFICATIONS

Capacity: Model 50-50 tons, Model 50B-56 tons. Shut Height: 10" to 25". Ram Stroke: 3" to 8". Ram Adjustment: 3". Ram Face: 24" x 12". Bolster Plate: 36" x 24" x 2½". Throat Depth: 12½". Opening Thru Back: 22". Speed: Model 50 Nongeared—100 S.P.M., Geared—50 S.P.M. Model 50B Non-geared—95 S.P.M. Geared—46 S.P.M. Higher speeds with air clutch.

L&J PRESS CORPORATION 1624 STERLING AVENUE, ELKHART, INDIANA

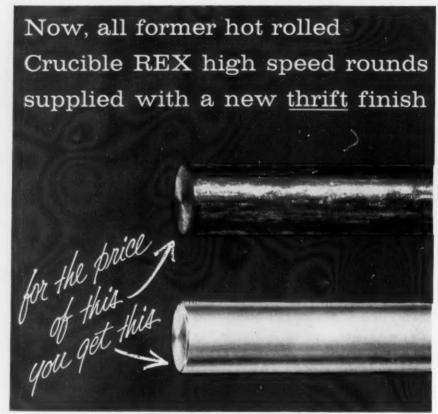




The Jacobs Model 91 Spindle Nose Collet Chuck for tool room and engine lathes.

The Jacobs Plain Bearing Chuck for drill presses, portable electric and pneumatic tools.

96 Collet Chuck for grinding machines, millers and jig-borers. Rubber-Flex® Tap Chuck for tapping heads and impact tools of all types. The Jacobs Impact Keyless Chuck especially designed for the aircraft industry. The Jacobs Ball Bearing Super Chuck for heavy duty and precision industrial use.



Here's a revolutionary, new Crucible policy designed to provide an improved product—save time and processing costs. Now, Crucible furnishes all REX® high speed rounds from %" up with a machined surface, close to size and free from decarburization. All bars from %" to %" round are supplied cold finished.

This new *thrift* finish means important savings to you — whether you've been paying extra for decarburization and stock removal, or grinding or rough turning rounds in your own shop. Of course, where extremely close tolerances are demanded, precise centerless grinding is still available at a small extra.

It's another Crucible "first" that offers you substantially more for your high speed steel dollar. Crucible Steel Company of America, Chamber of Commerce Bldg., 7th Ave. and Smithfield St., Pittsburgh 30, Pa.

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor - Railway & Power Engineering Corp., Ltd.

For more data circle 379 on Reader Service Card



FRONT PAGE News!

Here are four reasons R-O RELIEF cuts better, doubles cutter life

- Removes minimum metal behind the cutting edge, leaving more metal to support it and dissipate heat.
- Sharpens from edge to heel instead of heel to edge, avoiding common feather edge that quickly breaks down and dulls.
- Permits sharpening intersecting blades such as spot-face and chamfer without undercutting at intersection. Leaves no burr on work.
- Speeds resharpening by eliminating need for circle grinding cutter before resharpening edges.



ROYAL OAK TOOL & MACHINE CO. 29800 STEPHENSON HIGHWAY ROYAL OAK, MICHIGAN

Please send R-O Universal Form Relieving Fixture and Grinder catalog.

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rugged cutting...

...WITH LENOX HOLE SAWS

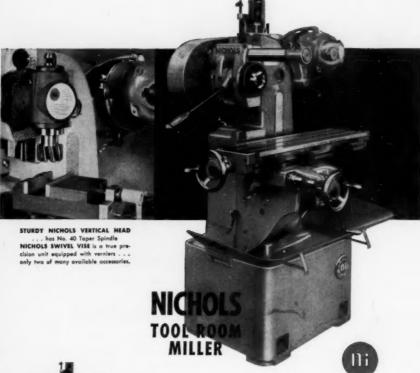
Built to take tough cutting jobs, the LENOX welded edge hole saw cuts clean, round holes in any machineable material from 9/16" to 6" in diameter.

Guaranteed shatterproof, here is a saw that will hold up, even under awkward sawing conditions. The rugged high speed steel cutting edge actually outlasts several standard grade saws. Cuts much faster. For performance and production, you can be sure of the best with LENOX Hole Saws.

For more information on this unusual tool, write today.

AMERICAN SAW & MFG. COMPANY SPRINGFIELD, MASSACHUSETTS . U.S.A.







STANDARD MODEL—A procise, versatile Hand Miller with Rise and Fall spindle. Table size 634" x 21".

NATIONAL DISTRIBUTORS

ACCURACY-SENSITIVITY-VERSATILITY

Gives the tool room what it demands — a compact, rugged miller with extreme accuracy and utmost flexibility. The Nichols TOOL ROOM MILLER is arranged for sensitive hand screw feed, has generous table surface — 8½" x 30" with 19" longitudinal travel. Precision feed screws have oversize, easy reading micrometer dials. Large hand wheels provide element of "feel" so important in precision milling. Rise-and-Fall Spindle simplifies set-ups. Lever table feed, furnished in addition to screw feed, increases usefulness. Selective speed ranges up to 5000 RPM.

2 educational 16 mm sound color films available for free showing—send for descriptive letter and reservation form.

MANUFACTURED BY W. H. NICHOLS COMPANY

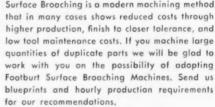
THE ROBERT E. MORRIS COMPANY

REM SALES DIVISION

5004 FARMINGTON AVENUE . WEST HARTFORD 7, CONN.

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THE FOOTE-BURT COMPANY CLEVELAND 8, OHIO Detroit Office: 24632 Northwestern Hwy., Detroit 35, Mich.

OTBURT

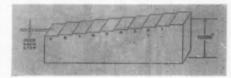
PIONEERS IN SURFACE BROACHING

For more data circle 383 on Reader Service Card



New Step-Block Test Shows .000012" Downfeed Accuracy on

Taft-Peirce No. 1 Grinder





dhdeo

g

10

This is the Toft-Perice No. I Precision Surface Grinder. It offers the exclusive tilting wheelhead plus a selection of seventeen different attachments for all-purpose application. Operators easily grind to ,00017", and to ,0003" with experience, Surfaces are so smooth they sed without lapping. Gagemaker tolerances easily produced with exclusive T-P Vernier Fine-Feed — for tool room or small parts production.

Tests of grinding accuracy on a Taft-Peirce No. 1 Grinder constantly prove the remarkable accuracy of this machine. The latest — a step-block demonstration — shows just what tolerances you can expect.

A four inch long block was ground to a height of 1.0000", then nine consecutive steps in depth increments of .0005" were ground, using the Vernier Fine-Feed. Result: Inspection of height at each step revealed an average error of only .000012"! A T-P Versachek Electronic Gage with 4000:1 magnification was used for inspection.

This remarkable downfeed accuracy offers superlative results for tool, die, and gage work; as well as for small parts production. Plan now to add this all-purpose precision grinder to your facilities — send

for Data Sheet MT-001 and Catalog.

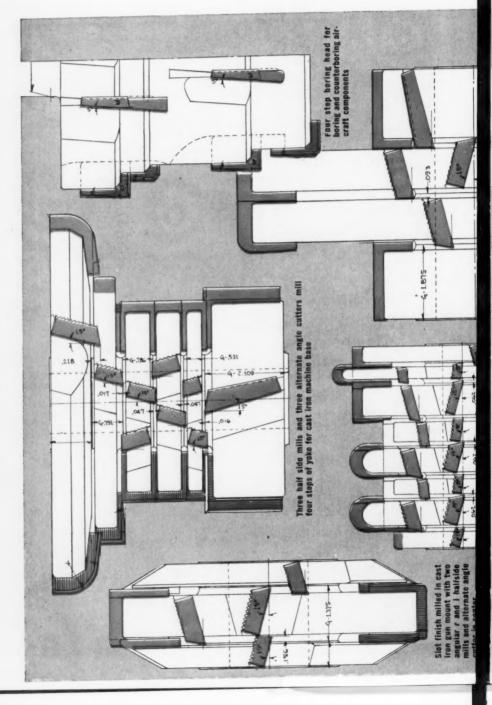


TAKE IT TO TAFT-PEIRCE

TAFT-PEIRCE MANUFACTURING COMPANY WOONSOCKET, RHODE ISLAND

T-P Means TOP Presision

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iternate angle cutter



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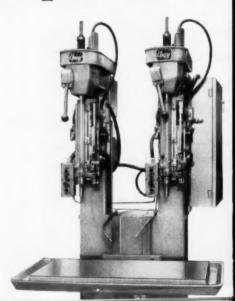
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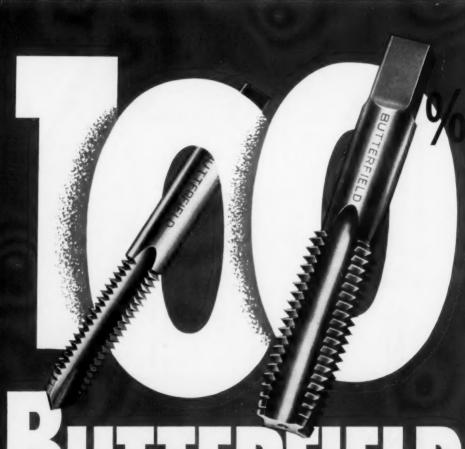
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TO CUT COSTS, BOOST PRODUCTION

ing; sometimes eliminates grinding and Often halves amount of stock left for grindpolishing operations. No lathe development in recent years has equaled template controlled turning for substantial cost reduction. Its advanOn most work, reproduces accuracy of template within ± .001".

tages, when performed the Monarch "Air-Gage Tracer" way, are many. This Eliminates the need for expensive form tools and the cost of multiple tool setups.

Allows a complete setup change in as little as 15 to 20 minutes; tool change in 1 minute.

job examples...The Monarch Machine Tool Write for complete descriptive booklet No. 2608. It contains dozens of typical Company, Sidney, Ohio.

Imparts a smooth, stepless finish on any

combination of cuts, whether turning,

Provides automatic sizing, thereby reducing spoiled work to the absolute minimum.

machine; in some instances as much as 8

to 10 times.

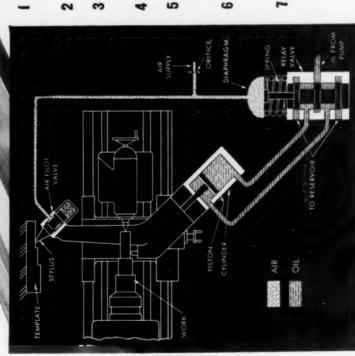
Always outproduces a manually operated

duplicating method:



Above is a Monarch Series 62 Preselector Dyna-Shift Lathe with "Air-Gage Tracer" and auto cycle unit. This duplicating means may be factory applied to all Monarch lathes.

and auto cycle unit. This duplicating means may be factory applied to all Monarch lathes.



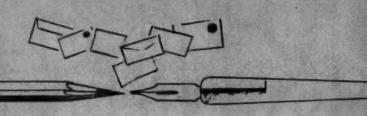
This diagrammatic drawing shows simplicity of "Air-Gage Tracer" operation. Note that design deals with both air and oil in constant motion. Result—super-accuracy piece after piece, job after job.

Exclusive Features of the "Air-Gage Tracer"

- The only lathe duplicator which utilizes the combination of air-hydraulic control. That's the secret of its superaccuracy.
- The air circuit is an open loop servo system which provides air-gaging and multiplies both force and motion.
- 3 It's the simplest and most trouble-free of all lathe duplicating methods. Tracer head maintenance is never a costly problem.
- 4 Stylus pressure against template is only 5 to 6 ounces, practically eliminating template wear.
- **5** Either a flat or a round template may be used. Never is it necessary to use a large, bulky round template so that it can be indexed periodically due to excessive wear from high stylus pressure.
- Available both in a rigid and swiveling type, the latter of which may be used at any setting between 45° and 90°. Universal nature of swiveling type a "must" for top production on many complex facing and boring operations.
- The only lathe duplicator offered optionally with full automatic cycling and potentiometer feed control.



OVER THE EDITOR'S DESK . . .



DOWN TO BUSINESS

According to most reports coming across our desk, purchases of consumer goods have been holding up reasonably well, and the assumption may be justified that the market for this type of equipment and material will continue strong. The great post-war boom in capital goods appears to be definitely leveling off. New orders for machinery, machine tools and structural steel have been declining. In the first half of this year, orders for machinery were about five per cent under the January level. New orders for structural steel in the first half were 21 per cent lower than in the like period of 1956, and machine tool orders have, in some places, lagged as much as 38 per cent behind the year-ago pace.

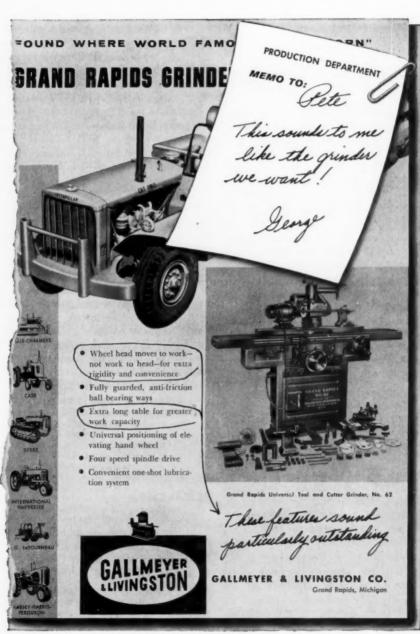
The long range outlook during the past decade—a period of boom during which annual production of goods and services rose from \$232 billion to over \$435.5 billion—has been that productive capacity sooner or later would overtake demand and that the economy would have to pause to consolidate its gains before seeking still higher lev-

els. It is now clear that several industries now have reserve capacity. The consolidation phase appears to be here. If this be true, the question in the minds of many business men is how long it will last. This last quarter of 1957 may well turn out to be the most important period for most business activity for a long, long time.

DIVIDING THE INCH

Spurred by a joint effort by scientists in industry and Government, metrology—the age-old science of dimensional measurement—is moving to meet its greatest challenge since Eli Whitney established the principles of interchangeable parts nearly 160 years ago. The challenge is to break through present limits and split the inch to the seventh decimal place—0.0000001 inch.

The initial cost of dividing the inch into finer increments to meet new demands in precision is comparatively modest—thanks to the substantial contribution in time, personnel and facilities that is being made by private industry to assist



Write for details GALLMEYER & LIVINGSTON CO., 408 Straight Ave., S.W., Grand Rapids, Michigan

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OVER THE EDITOR'S DESK . .



and supplement the basic Government research. Congress has appropriated \$75,000 to be used by the Bureau of Standards in this effort. Cooperating with the Bureau—and contributing both money and research facilities—are a considerable number of the nation's leading organizations.

Everyone, everywhere, will benefit from the cooperative effort of the following companies: The Sheffield Corporation; Ford Motor Company; New Departure Division, General Motors Corporation; General Electric; International Business Machines; DuPont; Van Keuren; Dearborn Gage; Taft-Peirce; Pratt & Whitney; DoAll Corporation; Hughes Aircraft; Greenfield Tap & Die and Timken.

The prime objective of the program on which these companies have begun is twofold: 1. To develop master gage blocks that can be reliably and absolutely stabilized to one tenth of a millionth of an inch; and 2. A parallel objective, to improve present interferometers, or light wave measuring instruments, so they can be used to give measurements accurately to one tenth of a millionth of an inch.

When the seventh decimal place—one tenth of a millionth of an inch—can be reliably stabilized in metal and measured to the satisfaction of the metrology scientists, precision measurement and manufac-

turing techniques can advance to new peaks. The success of the project will make possible more reliable and more uniform gages and techniques. These in turn will mean more accurately fitted and mated manufactured parts and more efficient, trouble-free performance, decreased waste of high-cost materials in production operations and more economies for both industrial and commercial users of manufactured products.

Success in attaining the seventh decimal place in dimensional measurement and size control will also help speed the development of such coming scientific miracles as passenger and freight shipments by means of guided missles. A missle's working parts may be machined and measured to tolerances, in some cases, as close as four millionths of an inch. These and other wonder products of tomorrow, some of them on the drawing boards today, await the coming solution by government and industry of this pressing problem in measurement in order to pass on their benefits to the American consumer.

RESEARCH

We have found some valuable food for thought in a talk titled "Executive Planning for 1970" given by Mr. J. Irwin Miller, Chairman, Board of Directors, Cummins Engine Company. In part, he says: "Of all changes between now and the year 1970, the most important will be in that which we call research. Here I think I should make



Setting up the wheels shown at right is an easy job. The high capillarity of ALUNDUM polishing grains improves and speeds up the wetting process with glue or cement.

How polishing costs are being cut...NOW

Trend to wheels set up with ALUNDUM* abrasive is spreading the money-saving "TOUCH OF GOLD"

Many plants where polishing jobs are important find that a change-over to wheels set up with Norton ALUNDUM abrasives results in better, faster, lowercost polishing.

In particular, preferences for S and R type grains are increasing rapidly. The S type, available in 14 to 90 grit sizes, is specially surface-treated to give the abrasive much greater adhesion to glue or cement. The R type, made in 100 to 240 grit sizes, also gets a special surface treatment, to improve its adhesiveness for use with glue only.

Typical advantages common to all ALUNDUM polishing grains include:

- · Uniform grain shape, that assures a fast, uniform cutting action.
- · Uniform grain sizings, with no oversize grains that mar the finish, no undersize grains to loaf on the job.
- · High capillarity, assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels. The booklet "Setting Up Metal Polish-

ing Wheels and Belts" contains valuable

facts on the various types of ALUNDUM grain . . . on the applications of canvas, leather or wooden wheels . . . and on the best means of preparing wheels, with cement or glue. Ask your Norton distributor for it. Or write to Norton Com-PANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.



Making better products ... to make your products better

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OVER THE EDITOR'S DESK . . .



two comments. The first is that the inventive capacity and mechanical inspiration of man has never been higher than it is today, and therefore, in the next thirteen years the businessman should anticipate and assume the rapid obsolescence of all his products and should endeavor through research to be, himself the one who obsoletes them, realizing that whatever he is doing, whatever he is making, there is a better way of doing it and a better way of making it.

"The second comment is that today's business man should also realize that research can be the most purely wasteful of all his business activities. If the head of a business indulges in research, as many do, just to solace his own fears of the future, and plays no personal part in this agonizing function, then he will only come to the end of his cycle all the sooner. If research is to be fruitful, it must be a major daily concern of top management. and, if it is to succeed, those who conduct the research must have a solid understanding of the true needs of their company, of its industry, and of its customers. Unless the top management of a company and its research staff are in the most constant and intimate kind of communication, research will amount to little and can be a great drain on any company.

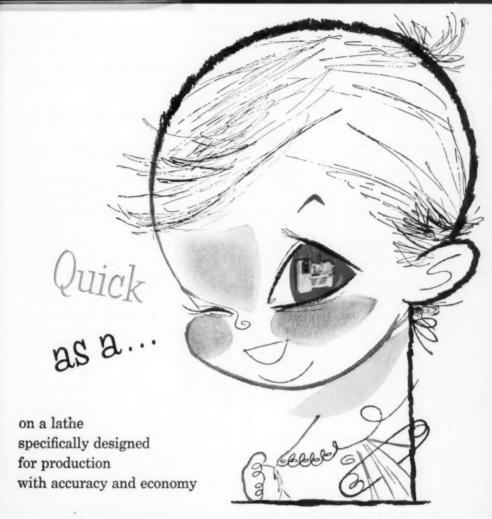
"Research, therefore, is a gen-

uine business risk but it is one which must be undertaken. Despite all its perils, the truth remains that in this wildly imaginative technical world in which we find ourselves, a business manager should not sleep too easily at night unless he accepts the fact that there is a better way to do everything that he does and a better way to make everything that he makes, and unless he is determined, himself, to engage in disciplined effective research to obsolete both his own methods and his own products."

The foregoing remarks by Mr. Irwin should not go unheeded, particularly among those people and organizations who must face up to the growing demand that parts be produced which require less and less metal removal for their completion.



"I want all of you fellows to think of me as your friend—one it pays to keep on the good side of."



High speed turning, boring and facing are child's play . . . with the Lodge & Shipley HI-TURN Lathe. Whether on single or multiple-piece work, this 10" Production Lathe provides productive capacity at a price substantially below conventional lathes.



Designed for fast, convenient operation, it eliminates rarely used features, incorporates many standard features never before found at any cost in a lathe of this size.

The 10" HI-TURN gives you horsepower, rigidity and production you would normally expect to find in lathes costing twice as much. We can prove more production per lathe dollar . . . more production per operator hour!

Find out how the HI-TURN Lathe fits your turning requirements. WRITE: LODGE & SHIPLEY, 3055 COLERAIN AVE., CINCINNATI 25, OHIO

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REPRINTS AVAILABLE

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

- "Grinding Jet Blades by Abrasive Belt Method"
- "Automatic Drill Feeds Speed Production"
- "Forming Aerodynamic Structures"
- "Modernize Your Shop and Save Money"
- "Producing Critical Airplane Control Components"
- "Chill-Shunt Tooling in Tungsten Arc Welding"
- "Unique Tooling Setup for Gun-Drilling"
- "Let's Take a Look at Distribution"
- "Producing Leakproof Check Valves"
- "Converting a Grinder to Increase Production"
- "Floturning Jet Engine Parts"
- "How to Guarantee Your Own Success"
- "Magnetic Chuck Facilitates Drilling Operations"

modern machine shop

431 Main St., Cincinnati 2, Ohio

OVER THE EDITOR'S DESK . . .



TECHNICAL SESSIONS

With Summer vacation experiences fading into the background, production executives can start looking forward to the increasing tempo of technical meetings which inevitably are ushered in each year with the arrival of the Fall season. The important meeting dates for this month will be found on Page 48 of this issue. A good habit to acquire would be that of checking the "meetings" column each month.

Incidentally, it's not a bit too early to be making plans to attend the gigantic Metal Congress and Exposition, November 2 through 8, sponsored by the American Society for Metals, Second World Metallurgical Congress, Society for Nondestructive Testing, and the Metals Division of American Institute of Mining, Metallurgical, and Petroleum Engineers.

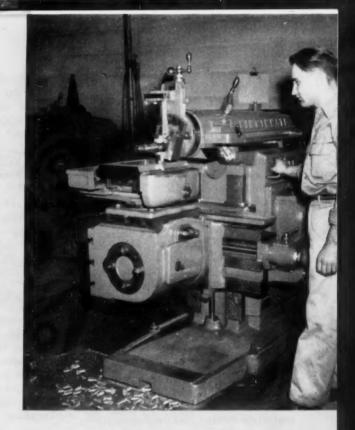
A BIG JOB

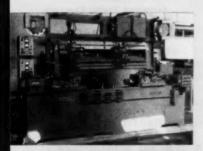
Anyone who travelled across the nation's highways this past summer could not help but note the great amount of construction in progress. From the gravelled improved road to the magnificent expressway to the super toll road one could see evidence of a considerable amount of activity. But with all this activity in street and highway im-

Accurate heavy cuts by this Cincinnati Rigid Shaper

... at NATIONAL ELECTRIC WELDING MACHINES CO.

Bay City, Michigan





The steel slide being machined will be used on a National Automatic MIG arc welder, such as shown above.

Economical production of this steel slide for an automatic arc welder requires heavy cutting with maintained accuracy. The machine chosen for this job is a 16° Cincinnati Heavy Duty Rigid Shaper. Some of the features which make this performance possible are:

- · Extreme rigidity due to heavily ribbed column.
- Exclusive Cincinnati 50 PSI pressure lubrication.
- Maximum accuracy due to extended ram bearing and slot-free ram.
- Fast, easy operation due to electro-magnetic brake and clutch with finger-tip control.

Write **Department G** for Bulletin "CINCINNATI RIGID SHAPERS" We also suggest you consult our Application Engineering Department on your machining problems.

Photos coustesy National Electric Welding Machines Co., Bay City, Michigan



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THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS - SHEARS - PRESS BRAKES



provements throughout the nation, every recent survey made of road and highway conditions indicates that we are still far behind in any kind of schedule which would provide adequate roads for the increasing amount of bus, truck, and passenger car traffic.

Actually, everyone benefits from good roads because good roads mean good business. Good roads have an effect on the price of practically everything we buy. An accelerated program of road and highway construction has an effect on the manufacturers of metalworking equipment because such equipment is needed to manufacture the tractors. the road graders, the trucks, the materials mining and mixing equipment, the reinforcing steel, the lighting equipment and the myriad of other products that go into the building and the maintenance of today's modern roads.

Good roads mean good business, but it will require the continued active interest of all people throughout this country of ours to plan and complete our needed roads and highways.



Silence

We have an inquiry from one of our members who is looking for a device which can be suspended over noisy machinery to absorb the machine and other operational noise, thereby soundproofing that particular area. Do you know of such a device? If not, can you tell me where we may be able to obtain this information?

S. Farkas National Association of Purchasing Agents 11 Park Place New York 7. New York

• We would suggest you try Burgess-Manning Company, 741 Park Place, Libertyville, Illinois, or Engineering Department of Johns-Manville, 22 East 40th St., New York 16, New York.—Ed.

Low-Price Tools

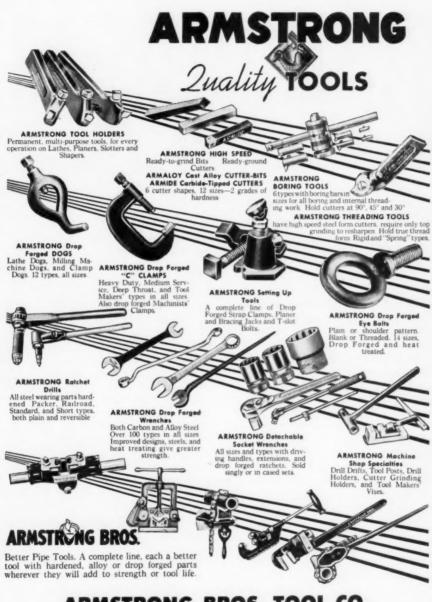
I am wondering if you would be kind enough to send me the names of concerns that manufacture a low price grinder in the neighborhood of \$400.00 to \$600.00 for performing work on small workpieces. We are also interested in a small milling machine.

Earl M. Scanlan Aeroplane Tackle Company 748 Lincoln Street Denver, Colorado

• Several names sent. Manufacturers having equipment described are invited to contact inquirer.—Ed.

More Information?

For additional information on any product mentioned in this issue, please use the READER SERVICE CARDS opposite pages 32 to 388.



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CHICAGO 30, ILL.

Plating and Surface Finishing Facilities for a Machine Shop

By C. C. CLAYTON

Dept. Head, Machine Shop Div., Torrance, Celifornia, Plant El Segundo Div., Douglas Aircraft Co.

Machine shops that are selfsufficient insofar as plating and finishing facilities are concerned are rare indeed. Most shops have to send parts to an outside department for processing, whether or not such processing is required before or after the part is finished. This involves both paper work and material handling. In many cases such parts may have to be routed for sandblasting or honing, then to another department for plating, and perhaps finally to a third department for heat treatment. If the part requires some finishing touches after heat treatment, it must be routed back and through the machine shop again before it is ready for the assembly line. If these exterior departments happen to be busy with other work, the machine shop parts may be delayed.

At the Torrance, California, plant of Douglas Aircraft Company, a

machine shop with its own processing facilities has been in operation for some time, and, despite the compromise that still requires 10 per cent of the parts to be processed outside, the arrangement has proved most satisfactory.

The production time element has been sharply reduced by not having to send the parts outside the department for processing. Furthermore, because our machine shop processing facilities were designed and installed with an eye to the specialized processing requirements of machine shop parts, and because the employees operating these shop processing facilities are intimately familiar with the specialized requirements, the quality of the processing work accomplished is consistently high.

The machine shop processing facilities consist of complete metal cleaning, treating, and plating installations, sandblasting equipment, liquid honing equipment, and a compact but versatile heat treating installation. These facilities are arranged in line with the normal flow of work through the machine shop.

"... processing as well as machining is under the same supervisory control."

If a part requires sandblasting, honing, plating, or heat treatment before final finishing, it's a simple matter to route it through the proper processing facility without lost time, lost motion, or extra paper work. And there will be no questions concerning the type or quality of processing it must receive, because the employee handling the work is thoroughly familiar with the work and in direct contact with the other machine shop personnel.

One of the biggest advantages of this arrangement is that processing, as well as machining, is under the same supervisory control.

There is no division of responsibility in producing a single, highquality component. If an employee in one of the machine shop processing departments doesn't understand exactly what is wanted, he has only to ask the departmental

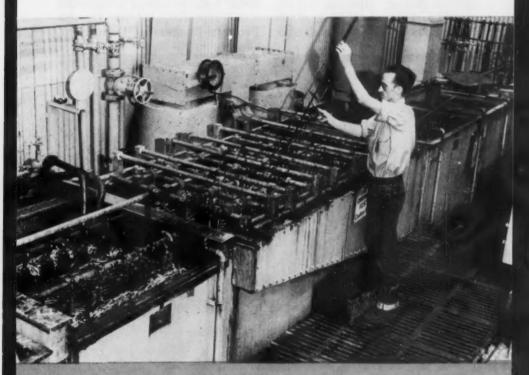


Fig. 1—This simplified seven-tank hard chrome plating setup can handle all work originating from machine shop. Current for plating is supplied by the department's own rectifier.

October, 1957

modern machine shop

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"... liquid honing provides an excellent bonding surface for dry lubrication of these parts."

foreman. Such an intimate exchange of information was impossible when our machine shop parts were processed by outside departments.

There is nothing revolutionary about the metal cleaning, treating, and plating facilities installed in the new Douglas machine shop. They are but smaller versions of similar equipment installed in the plant's general metal treating and plating departments. Equipment is available for cadmium plating, hard chrome plating, chemical nickel plating and electropolishing. A sulfuric anodic bath and a hard ano-

dic bath are available for treating aluminum parts. Liquid honing and sandblasting equipment is included in this layout — both strangers to most machine shop installations. A small oven is available for reducing stress and embrittlement in cadmium plated parts. A single rectifier installation in a room adjacent to the processing facilities meets all current requirements. A refrigeration unit in the same annex provides refrigeration for the anodic baths. Solution control is under the direct supervision of the Douglas Process Engineering Department.

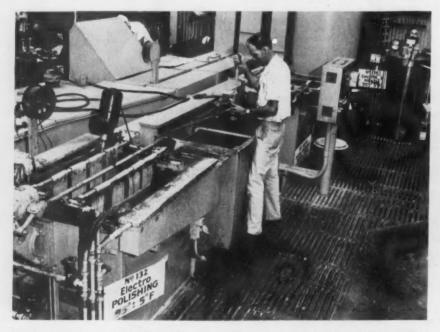


Fig. 2—Setup for electropolishing. This process brightens the work and provides excellent corrosion resistance. Nearly all of the stainless steel parts are electropolished.

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October, 1957

The cadmium plating tank used in this machine shop processing department is 30 inches by 5 feet long by 4 feet deep. Practically all steel machine shop parts that will be exposed to air during their service life are cadmium plated. When the base metal of the part has been heat treated to 180,000 p.s.i. or over, the parts are relieved after plating in a small electric oven operated at 375 deg. F. The solutions used are conventional.

Capacity of the hard chrome tank is 750 gallons. This tank will handle 100 per cent of all parts that need hard chrome plating. The major portion of the work here consists of plating parts for airplane hydraulic systems, especially the piston components. Some salvage work is performed on parts that happen to be machined undersize. Also, when the machine shop work load is light, some hard chrome plating work is done for the plant Tooling Division

Nearly all stainless steel parts are liquid honed. It was pointed out that liquid honing provides an excellent bonding surface for dry lubrication of these parts. Liquid honing is also used on parts that cannot be sandblasted because of critical dimensions. It is possible to remove heat treat scale from threaded parts by liquid honing without affecting the dimensions of the thread.



Fig. 3—Simplified cadmium plating installation can handle 90 per cent of all work originating in the machine shop. Cadmium plated parts are relieved after plating in a small electric oven.

"... the chemically plated nickel has a low coefficient of friction."

Liquid honing is a method of blasting that uses fine abrasives suspended in water. This solution is ejected against the part from a pressure nozzle.

Electropolishing is used, not only to improve the appearance of the part, but to increase corrosion resistance. Nearly all stainless steel parts are electropolished. This is accomplished in a proprietary solution with a chromic acid base, operated at 175 plus-or-minus 5 deg. F. The time varies from 15 seconds to 20 minutes, depending on the part. The solution readily penetrates into crevices and onto hidden

surfaces that could not be otherwise buffed or brightened.

Insignificant dimensional changes occur during this process, although it has been noted that prolonged treatment produces slight enlargement. Electropolishing demands heavy current concentrations, with 1.000-2.000 a.s.f. used for deburring. 500-1,000 a.s.f. for normal superfinishing, and 250-500 a.s.f. for descaling. Following treatment, the parts are rinsed for 5 minutes in water at 150 deg. F. The work is the anode in this process, and it must be racked to obtain good electrical contact.

Chemical nickel plating is used



Fig. 4-Miniature-size equipment for sulfuric and hard anodizing aluminum parts produced in the machine shop. Hard anodizing is used on aluminum wearing surfaces. Hard anodiz-

ing solution must be refrigerated to keep it at about 20 deg. F. Refrigeration pipes can be seen at rear center. (Photos courtesy Torrance Plant of Douglas Aircraft Company.)

on parts for the airplane hydraulic system. This process is still in the experimental stages. The nickel deposit is drawn directly from the solution at a deposit rate of about 0.0005 inch an hour. Each solution can chemical nickel plate up to 10 loads, depending upon the plate thickness required, before it must be replaced with a new solution.

Wear resistance and hardness of the chemical nickel plate is not as great as that provided by hard chrome. Like hard chrome plate. the chemically plated nickel has a low coefficient of friction. On many parts chemical nickel plating is the only surface processing used: on other parts, the chemical nickel plate is used as a base for hard chrome plating. Solution temperature is maintained at 190 deg. F. The outstanding attribute of chemical nickel plate is its high resistance to the hydraulic fluids used in airplane hydraulic systems.

Set up as it is, the new Douglas machine shop could continue to produce 90 per cent of its quota if the remainder of the plant was shut down.

From a specific viewpoint, it would seem that departmental autonomy is needlessly expensive due to the necessary duplications of plant equipment.

Convenience, production speed, unified supervision to minimize errors of misunderstanding, elimination of paper work, material handling, and above all product quality must receive consideration as advantages that may more than offset the cost of duplicate equipment.

(Reprinted from Products Finishing)

Production and Experimental Work on the Same Machine

The combination of a Bridgeport miller and a Howe and Fant turret drilling attachment, as shown herewith, enables a Greenwich, Connecticut, specialty shop to do both experimental and production jobs on the same piece of equipment.

The versatility of the miller has been increased considerably because the turret attachment permits a multiplicity of drills, reamers, taps or counterbores on the same machine — all cutting tools being changeable at the flick of the wrist. For more data circle \$9 on Reader Service Card



Miller equipped with turret drilling attachment is used to produce precision parts at Microphase Corporation, manufacturer of VHF and microwave filters for electronic systems.

WOVEN WIRE SLINGS FACILITATE

Handling of

BY IRA S. ROBERTS



Woven wire sling grasps jig firmly in a choke hitch to make turning of the load an easy task. Machined surfaces and sharp edges of jig are protected by the smooth surface and flexibility of the sling.

At the Grumman Aircraft Engineering Corporation, Bethpage, Long Island, the use of woven wire slings has eliminated the frequent replacement of wire and hemp rope slings damaged while handling dies and jigs.

In the course of repairing or manufacturing dies and jigs, parallel surfaces must be machined on the top and bottom. This, of course, means the parts must be turned over when machining the opposed sides. Woven wire slings accomplish this turning action quickly and easily without damaging either the load surface or the sling. Because of its construction, the woven wire sling flexes across its entire width. enabling it to wrap snugly and tightly around the load. Damage to the die or jig is eliminated because there are no sharp, narrow strands to cut or nick the edges of the load. while the all-metal sling itself easily withstands the cutting action of the sharp edges.

Previously, the turning operations were accomplished by using wire rope grommet slings on the dies and manila hemp grommet slings on the jigs. Because the sharp edges of the dies easily cut the thin

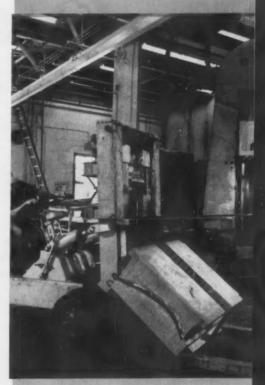
Jigs and Dies

strands, the wire rope slings had to be replaced at the rate of approximately twenty per month, while the machined edges of the jigs made equally short work of the hemp rope slings. In replacing the wire rope grommet slings used to turn the dies, the woven wire slings not only eliminated damage to the load, but also made the operation a oneman instead of a two-man job. The operator simply slips the new sling under the die, passes the male handle through the female handle and attaches the male handle to the lift hook.

In this installation, woven wire slings have also proved effective in handling the individual jig components during the assembly of the complete airframe jig by reducing the time required to assemble the complete unit. Other slings are used to handle bar stock in the steel stockrooms, warehouses and degreasing facilities of the plant. Here again, the flexibility of the woven wire sling enables it to wrap around the various sizes and shapes and hold the complete load in a firm grip that is said to prevent even the workpieces in the center of the load from slipping out of the sling.

October, 1957

Damage to parts handled is eliminated and sling replacement minimized.



Heavy dies are handled by a single operator on a fork truck. The strong transverse loop construction of the sling eliminates any danger of the sling suddenly snapping or tearing and dropping the load.

modern machine shop 109

Drill Jig for Variable-Center Hole Drilling

Device permits simultaneously drilling of two holes in $1/8 \times 1$ -inch sheet iron at 3 to 12-inch center distances.

BY ALEX S. ARNOTT

The drill jig shown in the accompanying drawing is designed for use in simultaneously drilling two holes in ½-inch thick x 1-inch wide sheet iron at any center distances from 3 to 12 inches. The length of material that can be handled ranges from 6 to 18 inches, depending on the hole centers.

The base, A, is made from boiler plate, the top of which is machined for fitting the jig parts to it. A relief is made on the base face to level it on the drilling machine table. Center bearing block, B, is held stationary to the base and is bored to afford a clearance fit for the guide bar, C. In addition, the block, B, is bored to provide a sliding-fit bearing hole for the ends of the adjusting screws, D. These screws are 1 inch in diameter and have eight threads to the inch. The ends of the screw are turned to afford a fit in the two end supports, E, and F. To properly position the workpiece in the jig, the stop, G,

and the lock screw, H, are mounted in the block, F.

Two adjustable bushing blocks, I, hold the headless press fit drill bushings, J, the blocks being bored to provide a sliding fit for the guide bar, C. Threads to match the adjusting screws are cut in the blocks, and tapped holes to accommodate the $\frac{1}{4}$ -inch set screws, K, are provided. Section B-B shows the assembly of the screws and blocks.

To nest the workpiece in the jig, a slot, approximately 1 inch deep and $\frac{1}{4}$ inch high, is machined in each block, I, directly below the drill bushings, as shown in Section A-A. The block, B, is of such a size that sufficient clearance is allowed for the workpiece to nest in the slots without touching the face of this block.

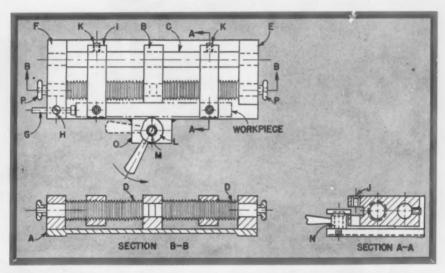
A clamping unit is provided for holding the workpiece in place during the drilling operation. This unit consists of a cam, L, which is relieved on one side to allow sufficient clearance for removing the workpiece from the jig when the cam is in the open position, as shown in dotted lines in the top view. The cam rotates on the shoulder screw, M, and is brought into line with the nesting slots by means of the spacer, N. The clamping unit is supported by the extension piece, O, which is welded to the base.

In operation, the gaging stop, G, is set to suit the bar length. Then, by turning the hand knob, P, on the screw next to the gage, the threads of the screw move the bushing block to the correct setting required for drilling the first hole at the proper distance from the end of the workpiece. The guide for bar, C, being stationary in the jig, aligns the block so that the bushing is in the correct vertical position. The set screw, K, locks the block in posi-

tion. The right-hand bushing is moved to correct centers in a similar manner, the operator setting the distance accurately between the bushings with the use of a machinist's scale.

The workpiece is inserted in the jig through the slots from the right-hand end until it is properly located by the stop. The cam, *L*, is turned in the direction indicated by the arrow, thereby pushing the material against the back of each slot and locking it in the jig. The two holes are then drilled to complete the operation.

To check the accuracy of the jig setting, two pieces of sheet iron that have been drilled can be matched by turning one piece end for end with the other and comparing the hole locations. If the hole centers are aligned with one another, the drill jig is in correct adjustment.



Drawing of drill jig designed for use in variable-center hole drilling operations.

JC10 De1, 175/

Producing Aluminum

Alcoa's Cleveland Works produces bulkhead forgings for Boeing B-52 Stratofortress that have cut total machining man-hour requirements by 62 per cent.

By BARTLETT WEST

U. S. Air Force giant forging presses, coupled with Aluminum Company of America's production skill and experience, today are boosting the value of Uncle Sam's air de-

fense dollar. A dramatic example is the slash in production costs achieved for Boeing Aircraft Company's world-girdling B-52 Stratofortress. The huge jet bomber's main land-

In the illustration below, a blank is shown being prepared for a landing gear trunnion. The forging subsequently produced from this particular blank cut 750 pounds from the machining requirements by approaching more closely the finished product's dimensions.



Aircraft Parts



In the above view, an early model B-52, giant eight-jet intercontinental bomber, built by Boeing Aircraft Company, prepares to touch

down. The main landing gear bulkhead has been the target of a cost-cutting, weightsaving program planned by Boeing Aircraft.

ing gear bulkheads—the weight-supporting structure at each juncture of fuselage and landing gear — have been the target of an extensive costcutting and weight-saving program planned by Boeing. To make the program a reality, Alcoa developed and perfected new forging techniques for use with its Cleveland works facilities.

The forgings that resulted have cut total machining man-hour requirements by 62 per cent, and saved thousands of dollars in machinetool costs for each set of bulkheads produced. And the amount of aluminum originally needed for one set of bulkheads now produces eight.

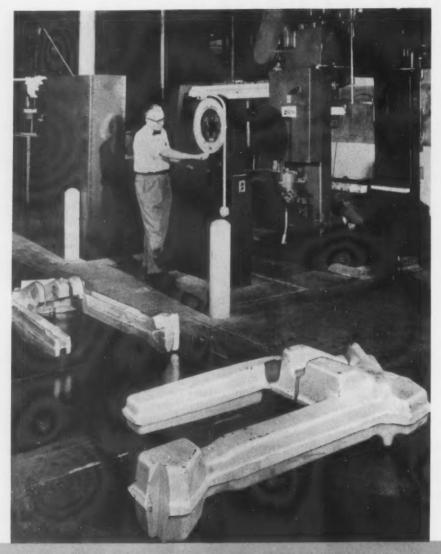
These tremendous savings are possible by forging to precision tolerances each aluminum part in the main landing gear bulkheads. They

leave the forging press at dimensions formerly reached only after extensive machining. Pyramiding savings result from less machining, material and man-hour requirements, and reduced shipping costs.

One such bulkhead member is the landing gear trunnion, a tough, impact-absorbing part shaped like a giant tuning fork. The step-by-step cuts in production costs achieved with the trunnion are typical of savings gained by Boeing's program for each bulkhead member.

In early 1954, Boeing rolled out the first Stratofortress built with forged aluminum parts in the main leading gear bulkhead, rather than a maze of welded tubular steel pieces. The trunnion was produced by machining 1,300 pounds of aluminum from a 1,625-pound contoured hand

Producing Aluminum Aircraft Parts . . .



Blocker type forging in foreground still required 645 pounds of aluminum to be machined away to arrive at a finished part

weighing 230 pounds. Final step in program was to forge part to precision tolerances, as was done with trunnien shown on scale.

forging. As a production method, this procedure would be difficult to justify. But in the short time available, it was the most effective method for producing a one-piece part strong enough to effectively withstand the landing impact of a 400,-000-pound plane.

Replacing the hand forging with an 875-pound blocker-type die forging to cut machining requirements was the next move by Boeing and Alcoa. The contoured hand forging was made by pressing and shaping an aluminum blank between flat dies until it had a rough outline of the finished part. A blocker-type die forging results from squeezing a blank between a single set of impression dies to obtain the finished product's general shape. It represents more efficient use of metal, compared to a hand forging, and can be produced from a smaller blank.

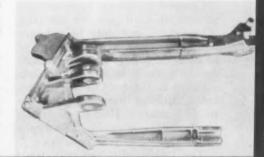
With the then existing maximum press capacity of 15,000 tons, it was the most efficient method that could be devised to produce the trunnion. For the Stratofortress part, the blocker-type die forging cut 750 pounds from machining requirements. But 645 pounds of aluminum still were being chipped away to arrive at a part weighing just 230 pounds.

Today, operating the Air Force's 50,000-ton press with skill gained from more than 40 years' experience, Alcoa precision forges the big part. It leaves the giant press weighing just 289 pounds — 67 per cent less

than did the blocker-type die forging. Very little machining is required in order to meet the trunnion's close tolerances, and manufacturing and shipping costs again have been reduced.

The impressive cost reduction history of the trunnion also is true for the bulkhead's side members. They, too, advanced from a hand forging to a trim, close tolerance forged part. In addition, Alcoa now forges the side members with a no-draft surface, precise enough for direct attachment of the big plane's aluminum skin.

Total savings resultings from Boeing's program to precision forge aluminum landing gear bulkhead components will multiply with the number of B-52's produced. A key weapon in the nation's present line of defense, the eight-jet intercontinental bomber is designed for strategic roles at speeds in excess of 600 m.p. h. Capable of reaching altitudes greater than 50,000 feet, the B-52 Stratofortress can range the world on photographic reconnaisance missions, or to deliver nuclear weapons.



Forged to precision tolerances, the main landing gear trunnian of the B-52 now comes off the press very nearly a finished product.



Included are suggestions designed to assist the shop or office supervisor in making his conferences more worthwhile.

By ALFRED M. COOPER
Contributing Editor

The modern industrial executive may spend as much as onethird of his working hours in a conference of some sort. As often as not he will be the leader of such a meeting, since most industrial conferences are departmental meetings attended by the lieutenants of the department heads.

Conferences have become the recognized medium for getting things done, not only in industry but in government. The pooling of ideas from twenty or thirty minds develops methods of doing things superior to the fruit of the keenest brain, tackling the same problems single-handedly. That is one reason for the decline of oratory as a means of persuasion, even in politics.

The industrialist not only leads or attends conferences daily at the plant, but because he is almost certain to be a leader in community civic and club affairs, he may well find himself leading committee discussions after hours. Considering the amount of time the supervisor and executive spends in conference, it is obvious that these meetings must be productive of good or they must represent a terrible waste of effort. At some time each of us has sat in at discussion meetings which were horribly dull and boring, interesting to no one present, and which, therefore, accomplished nothing worthwhile.

When this happens to us, for that hour or two we really suffer. The whole group suffers—the leader, unless he be quite obtuse, most of all. No one enjoys sitting at the head of a conference table under circumstances such as this.

Nevertheless, this is an axiom of conference management: that whatever occurs at any discussion meeting, good or bad, the leader must take for this full credit or blame. He's running the show (or he'd better be running it) and if he does and says the right things at the right times it will be a very good show. If he bawls things up, the smartest group that ever convened can't make a good conference out of it.

It is true that it is much easier to see what is right or wrong about a conference when you are seated in the group, rather than when you are at the head of the table. If you are observant at such a time, you can learn a great deal about conference

management.

Next time you attend any conference check the points listed below and decide for yourself whether or not this one will be a good conference — one productive of many new ideas, sharp differences of opinion, and eventual group consensus (probably not unanimous) on solutions to problems or courses of action to be followed.

Here are the factors to watch for when you wish to evaluate the worth of any conference:

1. Is the conference interesting?

Whatever else a conference may be, it will have little lasting value unless the group members are really interested in the problems placed before them for discussion. There are a number of factors that determine group interest, and most of these are directly under the control of the leader. The problems to be discussed must be of a type that may reasonably be supposed to be of interest to this particular group. The leader selects the problems and, if

he is the organizational superior, he also has quite a bit to say about selecting those who make up the group.

The problems presented to this group must be so worded that their meaning is entirely clear to every group member. When necessary, supplementary material — typed, mimeographed, blueprinted, or developed on the blackboard—must be ready when needed. Confusion of any sort as to the elements of the problems lowers interest and causes the group members to talk at crosspurposes.

The group must be comfortably seated, lighting and heating satisfactory, no one facing glare, and if possible, in a regular conference room about a table. There should be a minimum of conferences held in private offices, where the leader is seated behind his desk and the group is leaning back in chairs deployed about the walls of the room. Poor



". . . each of us has sat in at discussion meetings which were horribly dull and boring and accomplished nothing worthwhile."

"The leader must not permit the discussion to wander from the subject."

physical conditions for a conference can lower interest.

The degree of interest evidenced by the group at any conference will depend in some degree upon the relationship existing between the leader and the group. If the leader is the organizational superior of these people and there has been much on-the-job friction between boss and lieutenants, this will affect the interest which the group takes in the conference. I have known cases in which supervisors have found it impossible to lead successful conferences with their subordinates until they had improved their day-to-day relationship with these people.

Then, there are many things the leader can do in the course of the



"There should be a minimum of conferences held where the leader is seated behind his desk and the group is leaning back in chairs."

conference itself, and usually unwittingly, that will tend to kill the group's interest. He may, for example, talk too much—especially if he is the boss of these people and he tells the group what is what at any point in the conference.

Naturally the group is going to think, why did he tell us he wanted our opinions, when he has already decided what is to be done? Group members like to feel that their expressed opinions, and especially their consensus, arrived at after thoughtful discussion, have an excellent chance of being implemented with executive action. When the leader casually overrides group consensus, interest drops sharply. When he does this repeatedly, the interest in none of his conferences ever rates highly.

The leader may kill interest by being too hardboiled with group members, or he may be too wishywashy. He can (and should) tell any group member when he is out of order (because he is attempting to monopolize the discussion, or carrying on private conversations, or getting angry when disagreed with) but he can do this without creating antagonism. If he fails to control the conference situation at all times, the group loses respect for him and also loses interest in the proceedings.

The leader must not permit the discussion to wander from the subject. The group is at once aware when someone digresses, and they

expect the leader to get the wanderer back on the subject without loss of time. If he does not, they realize the discussion is getting nowhere, and they lose interest.

If the leader knows his business, he can control the conference deftly, almost without the group being aware he is directing matters. In general, when he is really running things, the group knows they have a leader, but the man at the head of the table never appears to obtrude his opinions so as to slow up the discussion. But in a properly conducted conference, the head of the table is forever at whatever spot the leader happens to be seated.

The group's interest in any conference fluctuates from time to time, depending on many factors. In observing a conference, I like to estimate the interest existing at five-minute intervals, on a scale of 0-to-100, and then average these readings for the entire conference. Group members indicate interest by the amount of voluntary talking they do, by their tendency to disagree, by the degree to which they interrupt one another, and by the attention they pay to the man who is talking.

Lack of interest is registered by constant fidgeting, tapping feet on the floor, frequent glances at watches, and a general air of boredom amounting at times to acute suffering. It is not surprising that an uninteresting conference accomplishes nothing.

On one occasion I had an unusual opportunity to evaluate the degree of interest prevailing in a conference of mine. On the evening

of March 10, 1933, I was leading a discussion with a group of industrial executives in Los Angeles. Ten minutes after I opened this conference the great earthquake of that year shook and tore at our downtown office building, apparently bent on its immediate destruction. During the early tremors the discussion continued, one member of the group pounding on the table with his right hand to emphasize a point he was making, while with his left he reached behind him to support a heavy bookcase that toppled precariously.

When the earthquake reached the peak of its intensity, it was impossible to remain seated at the table, and the discussion was interrupted. Yet as soon as the successive waves began to subside the group members indicated their readiness to resume the conference. The discussion would undoubtedly have been completed, but the leader had



". . . the group is going to think, why did he tell us he wanted our opinion when he had already decided what is to be done?"

"The basic idea in the conference is that those participating will talk whenever they have anything worth saying."

had more than enough of that sort of thing for one night, and adjourned the conference forthwith.

No public speaker could hold his audience through such an earth-quake as that one. But there is in the conference situation the possibility for a degree of interest that is almost unbelievable. It is based on the desire of every member of the group to express his convictions on some subject—a more powerful desire than his wish to listen to the opinions of anyone else on that subject.

2. Does the leader call on group members for responses?

If he does, this is bad business. It is an indication that the leader knows no other way to get people



". . . one member of the group pounded on the table with his right hand while with his left he reached behind to support a bookcase."

to talk than by calling on them. The worst possible manifestation of this error is when the leader calls on members clockwise or counterclockwise around the table.

The basic idea in the conference is that those participating will talk whenever they have anything to say worth saying. This is true even in the case of a group member who has language difficulties. But until he has formulated his thoughts and is ready to talk, he will resent being put on the spot by being called on for a response. If you doubt this, you have only to recollect some conference in which you were asked for an opinion before you had formed one.

Most people experience a quick flash of resentment here, and at best probably will mumble something inane about agreeing with the last speaker. This is not the sort of response that makes conferences interesting and worthwhile. All response should be spontaneous. Given a little more time, the one called upon would have come into the discussion with a considered opinion that would have been of value to the discussion. Now he may tend to withdraw from the proceedings.

Personally, I will not call on any group member for a response if he sits silently for six months in my conferences. I have never known this to happen. As a rule the one who is silent in early conferences finally breaks the ice, and thereafter you may have to watch that he



". . . the one who is silent in early conferences finally breaks the ice and thereafter he may do more than his share of talking."

doesn't do more than his share of the talking.

When you open any conference, sketch the general purpose of the meeting in a few words, and without giving the group any inkling of your opinion on these matters. Then, within three minutes, put your first problem before the group. Now stop talking altogether and give the group time to think. Expect the first responses to be rather superficial. Those who take more time may well come up with the best ideas.

Thereafter, let the group do most of the talking. The leader's participation factor never should exceed 20 per cent, and this should almost entirely take the form of *questions*.

3. Does the leader know how to phrase, and time the delivery of follow-up questions?

Here is the crux of all good conference leadership. Watch the leader and see whether those little extemporaneous questions he uses are phrased and timed so that they fit smoothly into the discussion. They must slip in without disturbing the group's thought; indeed, they must provoke further thought. In no sense should they indicate, even by voice inflection, the opinion of the leader or any desired response.

Follow-up questions are most effective when the leader is thinking just a little ahead of the group. They may actually direct thought into desired channels with the intention of securing eventually a predetermined conclusion from the group. More often, however, they are designed to make sure the group gives sufficient thought to every phase of the problem under consideration before coming to a conclusion that is altogether their own, and not influenced by the leader.

Follow-up questions should be short and pithy. One of the very



"... the leader may slip in a follow-up question that appears to be perfectly phrased to fit into the discussion yet falls flat . . ."

"A group likes a leader who proves that he is open-minded . . ."

best is "Why?" and another good one is "How?" A definite indication of the extent to which the leader has complete control of the conference situation is found in the way a group responds when he drops such a capsule query into the discussion. If they ignore it, then he has lost control; if they follow the lead he has given them without hesitating, then his control is considered excellent.

Occasionally the leader may slip in a follow-up question that appears to be perfectly phrased to fit into the discussion, yet the query falls flat and even tends to slow up the discussion. In such a case, it will be found that the leader's timing was a little off and the question was not quite pertinent at the moment it was asked.

This usually occurs when the leader has for a moment lapsed from careful attention to what is being said by the group members. When this happens he may even ask a question that has already been answered, minutes earlier, by some member. This leaves the group with the feeling that the leader is not thinking along with them, and to this extent he loses the respect of the group.

4. Does the group like and respect the leader?

A group likes a leader who proves he is open-minded by not attempting to force his own views on them. They like him also if he keeps the discussion everlastingly on the subject. They very much like to have him give them credit for responses they have made, not by agreeing with them, but simply by commending them for having spoken. This may only take the form of a commendatory nod of the head, yet it is extremely effective, especially in encouraging a reticent member to participate more actively.

A group greatly respects a leader who, at all times, shows that he is in complete control of the conference situation. A group member may not be too happy if the leader requests him to drop a private conversation with a neighbor, and address his remarks to the group, but he will highly respect such a leader.



"A group greatly respects a leader who, at all times, demonstrates that he is in complete control of the conference situation."

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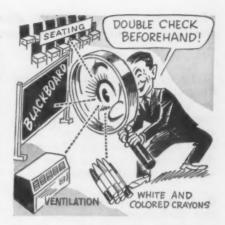
Again, it may become necessary for the leader to flatly request that a certain group member give some-body else a chance to talk. As a rule the too-loquacious one will be found to be fairly thick-skinned, and will take no offence. But he will thereafter cease to hog the discussion, and the result will be better-distributed response from the group. Such tactics, when called for, add to the respect of everyone present for the leader.

The leader should aim for a nice balance between liking and respect. But if he can't get both he will do well to secure at least the respect of his groups. There is nothing on earth so pitiful as the sight of a weak conference leader sitting at the head of the table and bleating helplessly at a group which pays him little or no attention.

5. Has the leader really prepared for this conference?

As a conference proceeds it becomes evident whether or not the leader has given thought to what he hoped to accomplish in this meeting, in advance of its opening. A conference should be planned as carefully as a public address, even though the leader is to do little of the talking. The objective of the meeting must be at all times clear in the mind of the leader. He must have determined exactly how the major problems for discussion are to be phrased. Perhaps it will be advisable to have these written out beforehand.

The physical conditions for the conference (seating, ventilation, blackboard, et cetera) must careful-



"The physical conditions for the conference (seating, ventilation, blackboard, et ceteral must be very carefully checked in advance."

ly be checked in advance. Blackboards do not always have adequate white and colored crayons. All materials for distribution to the group must be at hand, in sufficient quantities. Permit telephone interruptions only in emergencies.

The leader must give some thought, in advance, to various possible turns the discussion may take, and decide how he will meet these situations. He cannot, in advance, actually phrase follow-up questions. But he can consider the general trend these should take, and thus have less difficulty formulating them when the time comes.

Here's a suggestion with reference to planning: There is danger that regularly scheduled departmental meetings may be convened whether or not there happens to be anything to discuss. The leader should determine whether a particular meeting is justified; if it is not he should call off such a meeting.

"No matter how weighty the discussion, everyone present should thoroughly enjoy the conference."

The tip-off here may come after the group has been assembled, when the leader looks vaguely about and opens the meeting with "Well, what shall we talk about today?" If he doesn't know, probably the group doesn't either, but they know they are in for a wasted morning.

6. Is the group enjoying this conference?

If a conference is properly conducted the group enjoys every minute of it. They like to attend a meeting that is interesting. They enjoy either participating in, or watching, a good fight, and there will occur genuine battles of wits in any conference worthy of the name.

No matter how weighty the dis-



"They enjoy either participating in, or watching, a good fight, and there will occur a battle of wits in any worthy conference."

cussions, there is no reason why everyone present should not thoroughly enjoy participating in the conference. Properly conducted, there is ample opportunity for everyone to express himself repeatedly, and group members like to talk freely.

Then too differences of opinion stimulate thought. Only when there is deadly agreement between group members does the meeting become

dull and boring.

There is no reason why humor cannot be injected into the most serious discussions. The leader may do this, preferably by pointing up something a group member has said so as to give it a humorous twist. A quick, hearty burst of laughter may clear up a situation that has become a little too tense, yet this does not serve to break the group's chain of thought.

If a conference group is enjoying itself, those present would obviously rather be right there than anywhere else, and this is a situation to be desired in any conference.

7. At the conclusion of the conference did the group feel something worthwhile had been accomplished at that meeting?

If you have ever sat through a two-hour conference and left feeling your time had been wasted, you will not welcome an opportunity to meet with that leader again. Sometimes this feeling is accentuated when the



"If you left the conference feeling your time had been wasted, you will not welcome an opportunity to meet with that leader again."

leader fails to sum up the sense of the group's deliberations, and no vote is taken to determine the split in group reaction.

The leader should make an interim summing-up about every 15 minutes. This has the effect of stopping the rehashing of old arguments. Then at the close of the meeting he should make a final summation, carefully outlining, without bias, the two or more solutions offered by the group, and call for a vote. Whenever practicable, it is excellent motivation to inform the group that executive action will be taken in accordance with the decision they have indicated.

Next time you attend any conference, check the work of the leader in terms of the seven points we have numerated. Then, the next time you *lead* a conference, check yourself as the meeting progresses in order to see if this conference is as successful as it should be.

AWS Welding Handbook, First Section. Publication of the first section of the Fourth Edition of the Welding Handbook has been announced by the American Welding Society. Written in easily understood language, profusely illustrated and extremely well indexed, it serves the purpose of a textbook on welding as well as a reference work.

The Welding Handbook has long been recognized as one of the most authoritative works available on welding and welding technology. Its maximum usefulness, however, has been limited by the impossibility of keeping it up-to-date. This problem has been solved and the gap bridged between research, development and printed text by a new concept in handbook publishing. Instead of a 2,500-page handbook, which took five years to prepare, the Welding Handbook has been divided into five sections and the section now available took only one year to prepare.

This continuous yearly revision will provide a Handbook which is completely up-to-date and which has unusual flexibility. Should a need arise for information on a particular subject it can be included in the current section instead of having to wait five years or more for the next revision.

The first section, "Fundamentals of Welding," contains the basic material—the fundamentals which are needed by all associated with welding activities. It is designed to be interpretive as well as factual. The 11 chapters contain over 560 pages.

Copies are now available at a cost of \$9.00 per volume from the American Welding Society, 33 W. 39th St., New York 18, New York.

Cold-Forming



This three-machine setup of spline rollers is used for splining rear axle shafts for Chrysler cars. The cold-forming operation is com-

pletely automatic. Parts are hand loaded on a belt conveyor at the prior operation for full transfer through three-machine setup.

Splined Axle Shafts

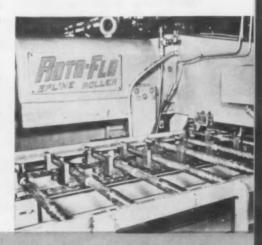
Using three machines, Chrysler plant rolls splines into shafts at rate of 360 parts per hour per machine.

Chrysler Corporation's Lynch Road plant in Detroit produces some 12,000 rear axle shafts per day for Chrysler-built cars. For splining the end of these shafts. made in three different body sizes, the plant uses three Roto-Flo coldforming machines designed and built by Michigan Tool Company. Spline production in this setup involves forming 30 teeth, 1.62 inches in length. Diametral pitch of the spline is 24/48; pressure angle is 30 degrees: outside diameter is 1.290 inches; and root diameter is 1.185 inches.

Chrysler uses three Model 1525 Roto-Flo spline rollers in an automated installation interconnected by belt conveyors. Average production rate is 360 splined shafts per hour from each machine. The splines are produced with a 5 microinch surface finish.

The operator on the prior operation places the parts on a belt conveyor that automatically loads them into V-shaped slots on the individual machine-loading conveyors. Once loaded, further operator attention is not required through the work cycle. Parts are returned by the machine conveyors to another belt conveyor for transfer to the heat treating operation.

Chrysler Corporation and Michigan Tool engineers working together selected M-2 (a high compression-resistant molybdenum high speed steel) for the forming rack material. Rack life has been increased to a minimum of 100,000



Close-up view of one of the automated spline rollers. Machine cold forms splines on rear axle shafts at a rate of 360 per hour.

Cold-Forming Shafts . . .

parts per grind for these 30 degree pressure-angle splines. In some cases, Chrysler has obtained as many as 200,000 parts from one rack grinding.

* * *

Better Wage Incentives. By Phil Carroll. Published by Mc-Graw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 240 pages, 6 by 9 inches. 100 line drawings and charts. Price, \$4.75. This book is designed particularly to show the need for more and better incentives, especially for indirect

people and supervisors, and how these may be brought about in the average company. In showing how to set up and effectively maintain a good incentive program, the book gives emphasis to the various types of incentive grievances, explains how to plan to prevent them and what to do about them if they do arise.

The chief causes of grievance are outlined and then each is covered in a separate chapter with suggestions for its solution. The thorough treatment includes helps on how to start a new incentive plan, incentives for foremen, how to prepare for incentive arbitration if it becomes inevitable, and helpful data on economies of wage incentives.

* * * * * * * * * * * * *

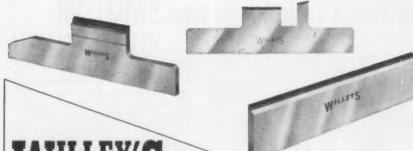
Stainless Machining Film

"Machining Stainless Steels" is the title of a film released by Armco Steel Corporation for free

Scene from "Machining Stainless Steel" film, showing lathe operator using a tool that has been bolstered for impact cutting.

use to all interested groups. The 30-minute sound motion picture shows how Armco engineers and metallurgists developed free-machining steels that can be worked at high rates of production. Tool composition and proper use for different kinds of tools are demonstrated. Tool grind principles are outlined, and proper setups to insure rigidity and to prevent vibration and shock to tools are shown.

"Machining Stainless Steels" may be obtained by writing to the distributor, The Jam Handy Organization, 2821 East Grand Boulevard, Detroit 11, Michigan. Prints are in 16 mm, so that the film may be easily shown with all standard projectors. The film is accompanied by a booklet providing a detailed description of the operations that are depicted throughout the film.



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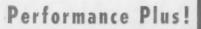
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TELL, SHOW, ASK-

A Safety Training

The author presents a time-tested formula for safety training that is easy to apply and remember.

By J. E. BEDFORD
Professor of Management
Armstrong College

Management-minded machine shop executives are putting more and more emphasis on safety training. They know that a safety-trained employee is a safety-conscious employee and consequently is less accident prone. A safety training program keeps accidents of all types at a low level with resulting savings in production time and benefit expense and improvement in employee morale,

Regardless of whether a safety trainer is employed or whether safety training is handled on the job by the supervisors, we believe that the safety training formula presented herewith will work. It is easy to remember—easy to apply. And, it follows a logical learning process of the SAFE way to perform any task around the shop.

This safety training formula, reduced to simple, easy to apply, easy to remember form is:

- 1. TELL
- 2. SHOW
- 3. ASK

TELL

The first step of this safety training formula is most important. It

sets the stage for the way the balance of the training will be accepted and remembered. The way you tell the employee how to follow the safe procedure is vital to the success of this formula:

1. Point Out Gain. Before you go into detail on how the task should be performed in the safest way, you will find it best to get the employee interested in the instructions. One sure fire way to do this is to highlight what he will gain by following your safety instructions.

For instance, in your safety instructions, you might say: "This is the safe, easy way to do this. You may think it is more complicated, but when you realize how much easier it is for you to do it this way, I am sure you will readily realize that this is the best way to do this."

This brief bit of instruction following the TELL part of the safety training formula applies to the "benefit" part of learning. There is something in it for the employee—he has an easier way to do the work. And, as a plus benefit, he gets a safer way to do it. Both of these appeals will definitely encour-

Formula

SAFETY TRAINING 1. Tell 2.Show 3.Ask promised. It is the proof-of-the pudding. It

age him to follow the instructions you give.

2. Use Step-By-Step Logic. After you have sold the employee on the importance of safety training by pointing out what he will gain, you are ready to go into more detail. Safety trainers have found this is most effective when the task is broken down into separate parts . . . a step-by-step way of performing the job.

Your job analysis will uncover some danger spots in the operation. A little thought by a safety-minded executive will lead to an easier and a safer way to do the job. And, because it has been broken down into its logical way, the learning will be easier and more memorable.

3. Prove Your Point With Regson Why. Following the TELL part of this safety training formula, you start out with something the employee will gain (easier work, for instance) and you follow this up with a reason why (the safe way of performing the task makes it easier). Then, in the next step, SHOW. it is proved to the employee that this statement is right.

SHOW

Here is where showmanship comes into the safety training formula. It demonstrates vividly how the employee will gain what is should be vivid

so the employee can easily visualize that what the safety trainer has said is right.

1. You Show Him. To demonstrate the safe way of performing any task around the machine shop, safety trainers find it is best if they do it first. This insures that the employee will not get mixed up on what is to be done and miss the point completely. Also, it gives the safety trainer a chance to demonstrate most effectively.

2. Have Him Show You. After you have completed the demonstration of the safe way to perform the job, you will want to be sure the employee understands completely. You have him show you how to do it. This plan has the advantage of showing the employee what to do and then making the employee part of the safety act when he does it the safe way.

3. Right . . . Wrong . . . Right. Some people learn faster when they see something performed in the wrong way. They can see that it isn't right or is dangerous easier than they can see it is safe to do it the recommended way. This is where some safety trainers follow the right way, the wrong way, and

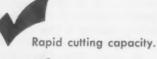
The first step of this safety train- gets a safer way to do it. Both of ing formula is most important. It these appeals will definitely encour-

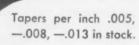
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Safety Training Formula . . .

then the right way part of this safety training formula.

It is best to show the employee the correct way of performing the task first. Then, show the wrong way to do it. This can be exaggerated to some extent so the emplovee will quickly realize he shouldn't do it this way. This is followed by the right way of performing the task to leave the final impression of the right (safest way) in the employee's mind.

ASK

Here is where you nail down the safe way of performing the task. It is important to keep in mind what employee benefit you are proving. As a case in point, consider the following example:

TELL: "You will find this eas-

ier." SHOW: Safety trainer shows the

> employee the easy and safe way to perform the task.

ASK: "Don't you agree that this is quicker?"

This illustration follows through with the TELL, SHOW, and ASK steps of the safety training formula. It fails, however, to nail down the main point to be considered easy and safe way to perform the job. The trainer and the employee, through their actions, have proven that this is the easy way. Then, the trainer asks an irrelevant question about speed of performancequicker.

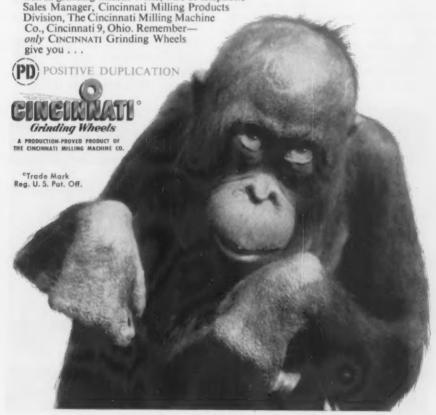
The following illustration is much

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tion about speed of performancequicker.

The following illustration is much

October, 1957

Safety Training Formula . . .

better because it asks a question that nails down the point of the training:

TELL: "You will find this much easier."

SHOW: Safety trainer shows the employee the easy and safe way to perform the task.

ASK: "Don't you agree that this is easier?"

It is important to cover all bases in appealing to the employees. But, it is also important to nail down each employee benefit as the demonstration goes along. It is sound safety training that will help keep accidents down in your shop.

Here is one more illustration of

this training formula to serve as a guide for better safety training:

TELL: "As a safety-minded executive, I'm sure you will find this safety training formula easy to use and most effective."

SHOW: (Pointing to the blackboard with the three parts of the formula, I say) "All you need to do is keep in mind these three steps — (1) Tell, (2) Show, and (3) Ask."

> (Time lapse while you try it in your next safety training session.)

"Now don't you agree that this is a very easy and effective way to conduct safety training?"



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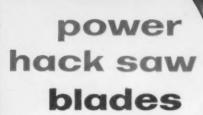
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THE CAPEWELL MANUFACTURING COMPANY Hartford 2, Connecticut

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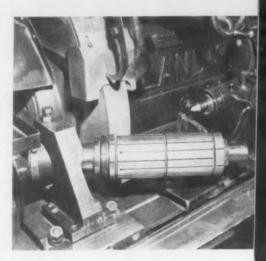
Production Grinding of Engine Sleeves

International Harvester plant uses special fixture incorporating expanding mandrel for close-tolerance grinding of dry liner sleeves for engines.

By L. B. LORAIN

The International Harvester Company's Melrose Park Works tooled up three years ago for the production grinding of dry liner sleeves for its 181 series engines. The tolerance requirements were: O. D. within 0.001 inch; taper within 0.0008 inch; wall thickness, 0.0015 inch; and out-of-round tolerance, 0.0005 inch.

The company chose an expanding mandrel for the job, but the precision requirements, plus the need for quick and easy loading and unloading, called for special tooling. Western Tool and Manufacturing Company of Springfield, Ohio, was called upon to design a special fixture incorporating an expanding mandrel for use on a Landis grinder. This fixture swings out at an angle from the wheel to enable the operator to slip the sleeve on the mandrel, then expand the mandrel with an open-end wrench and grind the piece. To unload, the operator tightens the nut at the driven end of the mandrel to loosen the sleeve. Retaining springs in grooves contract the expanding sleeve so that the operator can eas-

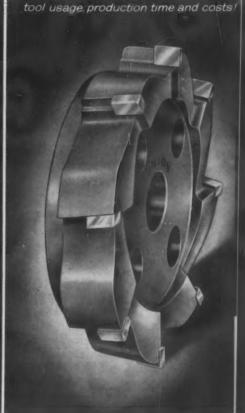


A special grinding fixture incorporating an expanding mandrel is used at International Harvester plant to production grind engine dry liner sleeves to close tolerances.

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Production Grinding of Engine Sleeves...

ily slide the workpiece off of the mandrel.

For three years the mandrel has been operating satisfactorily and has required very little maintenance. Records indicate that the arbor centers are ground about every three weeks to keep the mandrel within the specified 0.0002inch runout condition. Center inserts are replaced every nine months or so, and the mandrel shell is ground down and chrome plated every 18 months.

During the three-year period the company has had little trouble maintaining the accuracy required of the dry liner sleeve, and the original tools are still in service ard are performing very satisfactorily.

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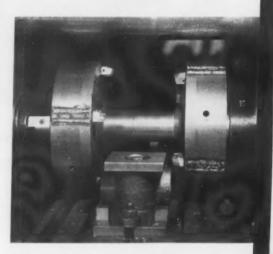
Straddle Milling Cast Steel Pivots

Specially designed straddle milling cutters in which Kendex "throw-away" insert tools are used on an old model mill have reduced tool cost to less than 11/2 per cent of former costs and cut milling time to one-sixth the time formerly required. The specially designed carbide milling cutters were developed by Reliable Machine and Manufacturing Company, Cedar Rapids, Iowa, to solve a small scale machining problem with an old chain-driven No. 4 Becker Brainard machine of 5 h.p. The job consisted of straddle milling two 3-inch diameter faces on cast steel pivot ends, as shown in the accompanying illustration.

The new cutters are 12 inches in diameter and each cutter contains four Kendex Style KSB-12 holders with Grade K21 square inserts, products of Kennametal Inc., Latrobe, Pa. Cutter bodies have a flywheel effect from their heavy construction which is advantageous with the limited power of the machine. Machine speed was increased

from 31 r.p.m. (back gear) to 240 r.p.m. (open drive) or 750 s.f.m. with the new cutters, and the feed was increased from 0.250 to 1.5 inches per minute. Depth of cut em ployed was retained at 3/16 inch.

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Specially designed straddle milling cutters in which "throw-away" carbide inserts are used on an old model mill reduced tool cost to less than 1½ per cent of former costs and milling time to one-sixth the time that was formerly required to machine cast steel pivot ends.

Marttord Special Multi-operation Indexing Machine equipped with four Skinner Power Chuck Fixtures



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Non-rotating Skinner Power Chuck Fixtures are

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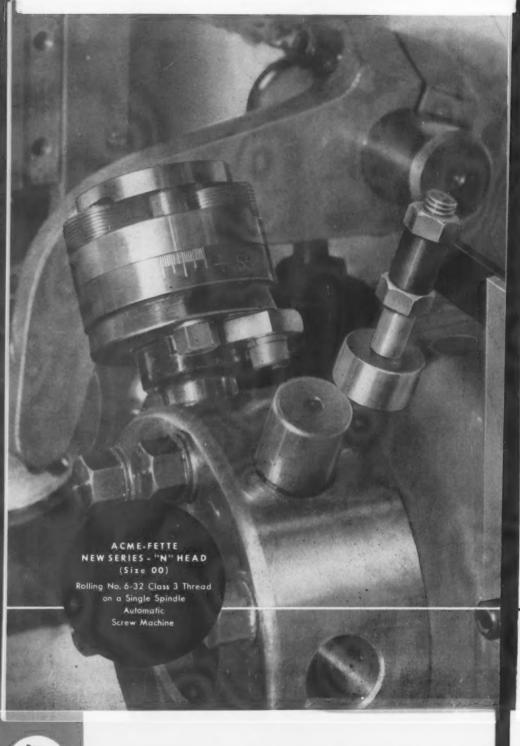


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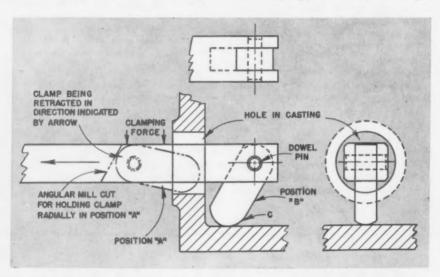
Several time-saving ideas and suggestions for the man in the machine shop.

Retractable Clamp

By F. C. ELMO

The accompanying sketch shows a clamp incorporating a principle which allows for clamping through a hole in a casting or other workpiece. Position, A, shows the loading and retracting position of the clamping member, which is pi-

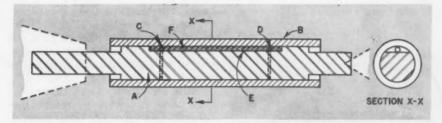
voted on a dowel pin as shown. After the clamp has been inserted through the hole in the casting, clamping force is applied until the clamping member assumes the position, B. Contour, C, on the clamping member provides for movement of the member to the position, B, when actual clamping is effected. The clamping force may be quickly and easily applied in various ways.



Sketch of retractable clamp designed to allow for clamping through a hole in casting.

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October, 1957



Cross-sectional sketch of chuck for holding soft metal tubing while finishing the ends.

Chuck for Soft Metal Tubing

By H. L. CAMPBELL

The problem of chucking pieces of soft metal tubing in a lathe so that the two ends of each piece could be finished was solved in our shop by using a mandrel of the type shown in the accompanying sketch. To make the mandrel, a piece of bar steel, A, was machined to such a diameter as to fit inside the tubing, B, and the ends of the piece, A. were turned down for gripping in the headstock and for centering in the tailstock of the lathe. In addition, two grooves about 3/32 inch in depth, as shown at C and D, were cut in the piece A. A recess was also cut in the center portion of the mandrel by filing or shaping to form a flat surface about 1/8 inch deep, as shown at, E. A straight round file, F, about 1/8 inch in diameter, was cut off to the proper length to fit in the recess E in the mandrel, and two grooves were ground around the file at the same locations as the grooves C and D in the mandrel. Small rubber bands located in the grooves held the file in place on the mandrel. When the

tubing was placed over the mandrel, a slight turn of the tubing locked it to the mandrel. On completion of the work, a reverse turn readily unlocked the tubing.

* * *

Method for Facing Off Hexagon Nuts

By H. J. GERBER

Occasionally, we have a need for small quantities of hexagon nuts of a less than standard thickness. In order to quickly and economically face down standard nuts to the thickness desired, we use the method shown in the accompanying illustration.

The nuts are grouped together between the jaws of a three-jaw self-centering chuck and the entire group of nuts is faced off together. The nuts are first loaded onto a backing plate, which is set loosely between the chuck jaws while resting on the face of the chuck. The chuck is removed from the lathe and loaded while face up on the bench. This procedure has been found entirely satisfactory where small quantities of nuts are to be



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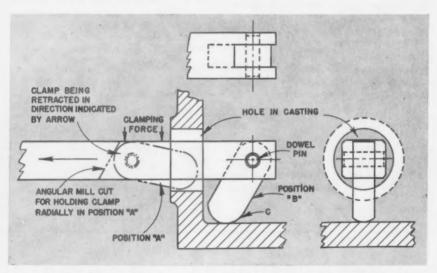
Several time-saving ideas and suggestions for the man in the machine shop.

Retractable Clamp

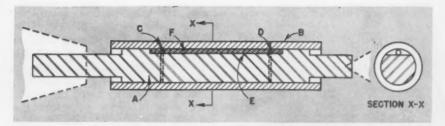
By F. C. ELMO

The accompanying sketch shows a clamp incorporating a principle which allows for clamping through a hole in a casting or other workpiece. Position, A, shows the loading and retracting position of the clamping member, which is pi-

voted on a dowel pin as shown. After the clamp has been inserted through the hole in the casting, clamping force is applied until the clamping member assumes the position, B. Contour, C, on the clamping member provides for movement of the member to the position, B, when actual clamping is effected. The clamping force may be quickly and easily applied in various ways.



Sketch of retractable clamp designed to allow for clamping through a hole in casting.



Cross-sectional sketch of chuck for holding soft metal tubing while finishing the ends.

Chuck for Soft Metal Tubing

By H. L. CAMPBELL

The problem of chucking pieces of soft metal tubing in a lathe so that the two ends of each piece could be finished was solved in our shop by using a mandrel of the type shown in the accompanying sketch. To make the mandrel, a piece of bar steel, A, was machined to such a diameter as to fit inside the tubing. B, and the ends of the piece, A. were turned down for gripping in the headstock and for centering in the tailstock of the lathe. In addition, two grooves about 3/32 inch in depth, as shown at C and D, were cut in the piece A. A recess was also cut in the center portion of the mandrel by filing or shaping to form a flat surface about 1/8 inch deep, as shown at, E. A straight round file, F, about 1/8 inch in diameter, was cut off to the proper length to fit in the recess E in the mandrel, and two grooves were ground around the file at the same locations as the grooves C and D in the mandrel. Small rubber bands located in the grooves held the file in place on the mandrel. When the

tubing was placed over the mandrel, a slight turn of the tubing locked it to the mandrel. On completion of the work, a reverse turn readily unlocked the tubing.

* * *

Method for Facing Off Hexagon Nuts

By H. J. GERBER

Occasionally, we have a need for small quantities of hexagon nuts of a less than standard thickness. In order to quickly and economically face down standard nuts to the thickness desired, we use the method shown in the accompanying illustration.

The nuts are grouped together between the jaws of a three-jaw self-centering chuck and the entire group of nuts is faced off together. The nuts are first loaded onto a backing plate, which is set loosely between the chuck jaws while resting on the face of the chuck. The chuck is removed from the lathe and loaded while face up on the bench. This procedure has been found entirely satisfactory where small quantities of nuts are to be

ideas from readers . . .

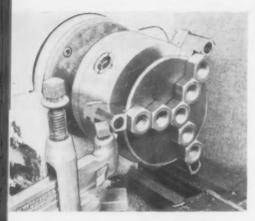


Illustration showing simple method for facing off hexagon nuts to desired thickness.

faced. For handling large quantities of nuts, the backing plate can be fitted with properly spaced pins, on which the nuts can hang until the chuck jaws are adjusted tightly on them.

Nuts are usually faced off on the back side in order to retain the original face chamfer. This method can be used to machine hex nuts of any reasonable size.

Die Stop Fixture

By ROBERT HILL

The drawing presented on the following page depicts an easilymade fixture that was used in our



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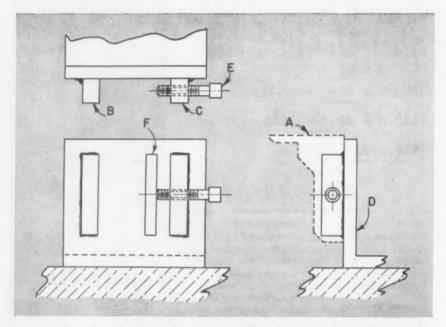
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Drawing of easily-made fixture for use in grinding die stops on a surface grinder.

shop recently for grinding die stops, A, on a surface grinder. With the method used prior to the design of the fixture shown, a hole was drilled and tapped in an angle plate and a socket head cap screw was used to fasten the die stop to the plate. The operator had to align the die stop so that the abrasive wheel would grind a smooth, accurate surface. This particular method proved very unsatisfactory inasmuch as accurate alignment could not be obtained at every setting of the die stop.

Using the fixture shown in the drawing, the parallel blocks, *B* and *C*, are accurately positioned and

then brazed or welded firmly to the angle plate, D. The block, C, is drilled and tapped to accommodate a socket head cap screw, E, which is adjustable to permit any regular width of die stop to fit onto the angle plate.

After the die stop, A, has been placed in the angle plate the screw, E, is tightened against the clamp block, F, which presses the die stop firmly against the block, B, and thus holds the die stop in a secure grip that allows the stop to be accurately ground. This fixture can also be used to hold other workpieces that are not too large to fit between the metal blocks B and C.



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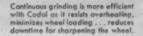
modern machine shop

153



Disc grinder (right) hogs off approximately .035 in. from rough Alnico castings. Small segmented bar-type magnets are ground at a high rate of production on an automatic double-spindle disc grinder. Stuart's Codol helps maintain profitable production...covers machine ways and moving parts with a rust-inhibiting film of light petroleum oil.







Codol's stability prolongs its effectiveness, reducing cutting oil costs. More than 15,000 gallons of a 3.5 per cent Codol and water solution are circulated from this outdoor reservoir to a battery of grinders in the Spaulding Works of Crucible Steel Company.

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Template checks accuracy of convex poles after grinding ends of rough Alnico castings. Codol keeps wheels sharp and free-cutting when "hogging off" stock on the disc grinder.



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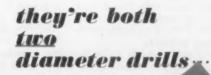
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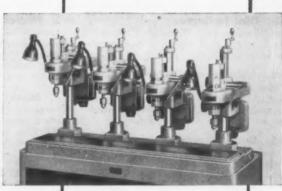
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City				Zo	Ng	State_	

modern machine shop

New plants and expansions . . . awards . . . meetings . . . new appointments.

Edited by R. M. SCHIFFER

MANUFACTURERS SUPPLY MOVES TO NEW QUARTERS

Manufacturers Supply Co., Grand Rapids, Mich., industrial distributor, has recently moved to its new building at 2851 Buchanan Ave., South West. Occupying 16,000 square feet of floor area, this completely modern facility will afford Mansco customers the last word in service and complete inventories. Established in 1928, and currently headed by Henry Idema, the company's history has been marked by a continued growth and progress that has made this current expansion possible. Featured among Mansco's lines are: Whitman and Barnes drills, reamers, carbide tools and end mills: Norton abrasives and Gardner Denver pumps and compressors.

ELGIN NATIONAL WATCH LAUNCHES DISTRIBUTOR PLAN

Elgin National Watch Co., Abrasives Division, Elgin, Ill., has announced a new tool stocking distributor program aimed at broadening its product coverage and improving customer service. The division expects to have a nationwide distributor plan in operation by the first of the year. It is said that the program primarily will be geared to expanding the market for Elgin's "Electro-Ground" carbide end mills and standard rotary tools. The Elgin rotary tool line, of "Golden Circle" tools, are solid carbide end mills, drills, burs and reamers.

Distributors and their territories already named include: Roy J. Heyne Machine Co., 707 Buchanan St., Phoe-



Manufacturers Supply Company's new building located in Grand Rapids, Michigan

nix, Ariz., and Circle Sales Co., 9151 N. Ninth Ave., Phoenix, Ariz.: Clark-Campbell Tools Sales Co., 4673 Landchester Rd., Cleveland, Ohio; and Browning Tool and Supply Co., 332 N. Capitol Ave., Indianapolis, Indiana.

GRINDING WHEEL INDUSTRY HONORS IRVING DANIELSON

Irving Danielson, vice president of Chicago Wheel and Manufacturing Co., Chicago, Ill., was recently honor-

ed for his sixty vears of continuous service to the industry. He was presented with a plaque from the Grinding Wheel Institute, whose membership is comprised of the major companies throughout the industry. Only one other such award has been previously made.

For the past sixty years, Mr. Danielson has been associated with Chicago Wheel and Manufacturing Com-



Irving Danielson, V.P.

pany, manufacturer of abrasives and mounted grinding wheels. He began his career as a boy in the shipping department at the original Chicago Wheel plant in the Russell Building at the corner of Canal and Randolph Streets, now the site of the Northwestern Railway Station.

Mr. Danielson with one of the longest service records in the grinding wheel industry, continues on an active basis as vice president at Chicago Wheel and Manufacturing Company.

PRECISION DRESSER



Desmond precision ball bearing dressers can replace diamonds on surface, centerless, and machine grinders in many instances-at substantial savings. Where diamonds are required for extreme final truing, Desmond precision dressers still can be used for semi-finish dressing. Five models available, each with easily replaceable hardened tool steel cutters and dust-protected ball bearings. Ask your Desmond distributor or write direct for catalog and full information.

> The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

For more data circle 426 on Reader Service Card

modern machine shop

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Hundreds of installations over the past few years have proved the economy of the only hardness tester which combines all scales of Rockwell Test (15 to 150 kg. loads).

The Kentrall cuts costs because it does the job of two conventional testers, requires only half the space and maintenance. Write for more detailed information, plus a list of prominent users who have switched to Kentrall.

KENTRALL

THE TORSION BALANCE COMPANY

Main Office and Factory: Clifton, New Jersey

Sales Offices: Chicago, San Francisco
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news of the industry . . .

S.P.S. FORMS PRECISION STUD DIVISION

Standard Pressed Steel Co., Jenkintown 22, Pa., has recently set up a separate manufacturing and sales division to meet the needs of conventional and nuclear power plant builders for special stud-type fasteners. The new Precision Stud Division, is producing critical large-diameter fasteners of the type required for major structural fastenings in power plant steam turbines, nuclear reactors, chemical process vessels and other large high-temperature, high-pressure equipment.

The new division is headed by Joseph P. Villo, manager of Standard Pressed Steel aircraft and allied products. Harold Hafer, Sr., is sales engineer and Walter Hambrecht is supervisor of manufacturing methods in the division. Rapidly advancing technology in the conventional power generation field plus the advent of nuclear energy plants has dictated a separate division for a product that Standard Pressed Steel has made as a special fastener for more than 20 years.



Harold Hafer, Sr., (left), Joseph P. Villo and Walter Hambrecht examine one of the special fasteners made by the Precision Stud Division, Standard Pressed Steel.

October, 1957

RADIAC®

ABRASIVE CUT-OFF MACHINE • TYPE "P" TRAVELER"

(FOR DRY CUTTING ONLY)



It Cuts
25/8" Wire
Bridge Cable
in Just
18 Seconds!



Featuring the new RADIAC®
Resinoid Reinforced
BLADE (18" in Diameter)

Handles the toughest cutting jobs, wherever stranded wire rope or cable is used . . . The RADIAC Type "P" Traveler Abrasive Cutoff Machine—in combination with the amazing new 18" RADIAC Resinoid Reinforced Blade—is the fastest, most efficient cut-off unit available. Its extra sturdy base and head eliminate vibration. It is fully portable when mounted on your own hand-operated or powered truck. Move the machine to the work, not the work to the machine! It is unsurpassed for maintenance work involving dry cutting of structural steel shapes, tubing and rods.

There are 10 other types of RADIAC Cut-off Machines—and a complete line of Abrasive Cut-off Blades—to meet your specific requirements. Write today for descriptive Bulletin. Exclusive dealers are located throughout the United States.

Use RADIAC Blades with RADIAC Machines

A.P. de Sanno & Son

PHOENIXVILLE PENNA., U.S.A.

Manufacturers of Abrasive Cut-off Machines • Abrasive Cut-off Blades • Grinding Wheels
For more data circle 428 on Reader Service Card

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news of the industry . . .

The completely integrated service offered by SPS will be unusual in this field. Sales, customer engineering and all equipment—including test facilities, production plating and inspection tools — will be centered in the one plant in Jenkintown. SPS has assigned a quarter of a million dollars worth of machine tools to the new division and has another \$250,000 worth of special stud-making equipment now on order.

It is claimed that the largest thread rolling machine ever built is on its way—a \$50,000 giant that can cold form precision threads in heat-treated stock up to 4½ inches in diameter. Larger diameter threads will be ground on this unusual equipment.

COLUMBIA STEEL ANNOUNCES PLANT EXPANSION

Columbia Steel Equipment Co., Inc., Fort Washington, Pa., recently acquired as a wholly owned subsidiary by Standard Pressed Steel Co., Jenkintown, Pa., has announced plans for a 53,000 square foot addition to its plant. The new addition will give Columbia, producer of steel office furniture, a total of 150,000 square feet of manufacturing and office space in the rapidly growing Fort Washington Industrial Park. It is basically a onestory steel structure with a secondstory office area. The first floor will primarily house relocated warehousing and shipping areas. There will be expanded office, engineering, research and development facilities in the second floor area. The new wing is expected to be completed early in 1958.

* * * * *



Now/Standardized Punches at 60% savings

A standarized, centerless ground perforating punch that gives you immediate savings!

ACCURACY

QUALITY

ECONOMY

Here's Why!

Centerless ground to within .0002" in diameter!

A special, high carbon steel insures tough, lasting durability!

Standardization means smooth high speed turn-out...at only 40% of the cost of making your own!

Large stock of high carbon punches in many sizes, means shipment the SAME DAY that your order is received!



Hundreds have standardized with ROSS high carbon and HIGH SPEED STEEL perforating punches. Write, today, for a FREE punch sample and descriptive literature!

ROSS EQUIPMENT CO., INC.

88 College Ave.

Rochester 7, N. Y.

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October, 1957

Electrical manufacturers know...

Assembling electronic instruments . . .





the shortest route...

d assembling ceramic insulators ...

to real production savings...

assembling terminal boards with Multipress



is DENISON'S light hydraulic MULTIPRESS

Denison, Denison HydrOILics, and Multipress are registered trademarks of Denison Eng. Div., ABSCO

The versatile Multipress is ideally suited for electrical manufacturing. Smooth, controlled hydraulic pressure gives absolute uniformity even with extremely close tolerances. Loose assemblies are prevented. Rejects are eliminated. Multipress adapts readily to frequent changeovers. Nine frame sizes, capacities from 1 to 75 tons. For a fast route to real production savings, write Denison Engineering

Division, American Brake Shoe Co., 1254 Dublin Road, Columbus 16. Ohio.

/ DENISON HydrOlLica

HYDRAULIC PUMPS • PRESSES • MOTORS • CONTROLS

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DR. W. H. SCHUETTE ELECTED TO DOW CHEMICAL BOARD

The Dow Chemical Company's Midland Division, Midland, Mich., recently elected to its board of directors, its general manager, Dr. William H. Schuette. Dr. Schuette started his

career with the company in the chemical engineering laboratory in 1941, moving to styrene monomer production and in succeeding years was associated with the production of Styrofoam, Down Plastic foam and Styron, the company's polystyrene plastic. He served three years as assistant production manager of Styron and was named plastics production manager in 1952. In January, 1955, he was pro-

moted to the position of assistant to the general manager. The following June he was elevated to the position of Midland Division general manager.

In addition to his responsibilities with Dow. Dr. Schuette is a director of Polychem Limited, an operation formed by Dow and Kilachand. Devchand Company Limited for the production of Styron in Bombay, India. He is also responsible for the operations of the company subsidiaries, Bay Refining Corporation and Bay Pipe Line Corporation at Bay City, Mich., and its new petrochemical plant under construction near Bay City.

Before joining Dow he served as

BEW New Flat Type



SPOTTING & CENTERING DRILLS

and Adapters

Produce accurate centers on screw machine work for starting follow-up drills.

Note short overall length — no body clearance. With point supported up close to the job — assure a true start or center, and perfect alignment.

Reduce tap breakage — use them to spot holes for tap drilling.

Right or Left Hand Cut - Same Price

Stocked in 90° and 118° Drill Points. Specify right or left cut when ordering.

T W L Price T W L Price

 ½
 ½
 ½
 \$2.00
 ½
 1
 2½
 \$3.60

 ½
 5%
 1½
 2.60
 ¾
 1
 2½
 \$3.60

 ¾
 5%
 1½
 2.60
 ¾
 1
 2½
 4.40

 ¾
 5%
 1½
 3.00
 ¼
 1
 2½
 4.60

B & S blanks and Center-Lock blanks for Do-It-Yourself people now in stock

Write for prices on blanks and drill grinding fixture.

B & W PRECISION PRODUCTS CO.

11393 E. Eight Mile Rd., P.O. Box 3865 Detroit 5, Michigan, Engineering Dept. M.

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Now - NO plate too small - 21515

NO panel too big

NO size limits on engraving



Engraving chassis can be detached from base and placed directly on workpiece of any dimension. Smaller plates can be easily clamped in a self-centering workholder which is standard equipment. New sturdy pantograph construction; heavy duty cutter spindle; two-way depth regulator.

Send for ooklet FR-1 men hermes Engraving Machine Corp. 13-19 University Place, New York 3, N.Y.



ENCO Self-Indexing HEXTURRET

Convert your lathes for turret work this quick, easy way. ENCO HEXTURRET gives you the accuracy, rigidity and speed you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

ENCO Mfg. Co. 4520 W. Fullerton Chicago 39



ENCO Manufacturing Co. 4520 W. Fullerton, Chicago 39. Dept. 1107

Address.

Please send catalog #53 and full details of ENCO HEXTURRETS.

Name	
Firm	
rirm	

For more data circle 433 on Reader Service Card

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news of the industry . . .

an instructor at Case Institute of Technology and was associated with the National Carbon Company and the C. O. Bartlett and Snow Company.

* * *

KEO MOVES TO NEW ADDRESS

After 16 years at 19326 Woodward Ave., Detroit, Mich., Keo Cutters, Inc., has recently moved to its own newly built factory. The manufacture of Keo center drills, keyseat cutters, center reamers, countersinks and mandrels has been transferred to its new address at 25040 Easy St., P. O. Box, Roseville, Michigan.

* * *

PROPER IDENTIFICATION

In the illustration appearing on page 176 of the September issue, D. H. McIver, Vice President-Industrial Sales, Ex-Cell-O Corporation, is shown at the left and James K. Fulks, Executive Vice President, is at the right.

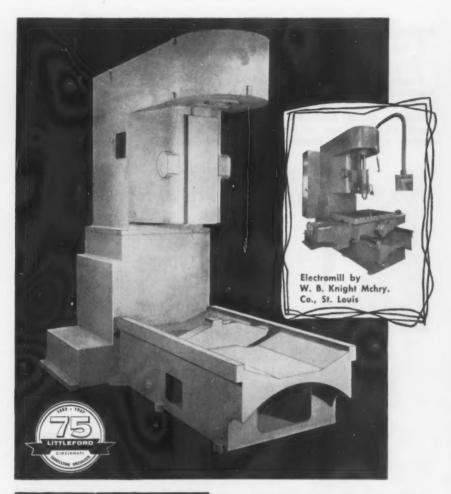


"Are you the people that manufactured that new experimental landing gear?"

October, 1957

industry news in brief . . .

appointed director of corporate relations. Donald K. Ballman promoted to director of sales and William R. Dixon



weldments give you greater design freedom!

The new design freedom Littleford weldments allow you, can open up broad new sales frontiers for your products. Littleford weldments are made quickly, with utmost precision and at surprisingly low cost. Why not send us your blueprint today for complete information and estimate? Littleford Bros., Inc., dept. LB 132—433 E. Pearl Street, Cincinnati 2, Ohio.

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October, 1957

modern machine shop



Pilot Your Way

industry news in brief . . .

Eugene L. Martinez promoted to manager of Boston sales office, The Dow Chemical Company, Midland, Michigan. E. H. Killheffer, Jr. succeeds Mr. Martinez as manager of Buffalo sales office. Donald Williams

appointed director of corporate relations. Donald K. Ballman promoted to director of sales and William R. Dixon promoted to general sales manager. Deane R. Ebey appointed manager of personnel administration.

Crucible Steel Company of America, Pittsburgh, Pennsylvania announces the appointment of Dr.

Robert W. Lindsay in the Central Research Laboratory. Dr. John H. Hoke appointed supervisor of Stainless Steels Section, Central Research Laboratory. John C. Mueller and George F. Barber named assistant treasurers.

The Somma Tool Company, Inc., Waterbury, Connecticut, announces the location of its new plant at Scott Road. Waterbury Connecticut.

J. E. Brinckerhoff, vice president. The Babcock and Wilcox Company, Beaver Falls, Pennsylvania, elected president of The Refractories Institute, White Sulphur Springs, West Virginia. James J. Barrett appointed manager of extrusion sales.



ONLY NEW HALLOWELL **FRECTOMATIC** STEEL SHELVING

gives you all these plus features

Fast assembly Fast shelf change or addition Straight-in, straight-out shelf change Independent shelf positioning Full use of shelf area Common side panels and posts Beaded posts and flanged shelves Full-depth shelf supports 4 classes of shelves

Investigate Hallowell ERECTOMATIC® before buying shelving. You'll find it easy to assemble and rearrange, economical to maintain. It is made of prime steel, is phosphate coated and finished in SPS green baked-on enamel. Other colors are available. Hallowell ERECTOMATIC is sold through leading industrial distributors and shop equipment dealers. Write us for complete information. Hallowell Shop Equipment Division, STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.

STANDARD PRESSED STEEL CO.



HALLOWELL SHOP EQUIPMENT DIVISION



For more data circle 435 on Reader Service Card

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to LOWER COSTS and Higher PRODUCTION!

> Avoid the Reefs **PRODUCTION BOTTLENECKS!**

Use and ASSEMBLY MACHINES

The advantages are too great to overlook: Speed never before equalled . . . Economy . . . Greater Accuracy . . . and Stepped-up Profits. Write for catalog now . . . Tell us your problem . . . Send parts or assembly and our Engineering Department will make recommendations.



BOWL FEEDER Electrical vibratory type to feed parts that cannot be tumbled.



BARREL FEEDER

with stationary ring cover for heavy-duty production.

DETROIT 26, MICHIGAN FORT STREET .

For more data circle 436 on Reader Service Card

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industry news in brief . . .

James M. Jaques appointed assistant sales manager, Nicholson File Company, Providence, Rhode Island.

Virgil P. Burgess appointed controller and V. Leonard Hanna appointed treasurer, Allied Products Corporation, Detroit, Michigan.

The Cincinnati Shaper Company, Cincinnati, Ohio announces the organization of The Cincinnati Shaper Company, Ltd., a subsidiary in Britain. David H. March appointed managing director. W. F. Mericle named export sales manager.

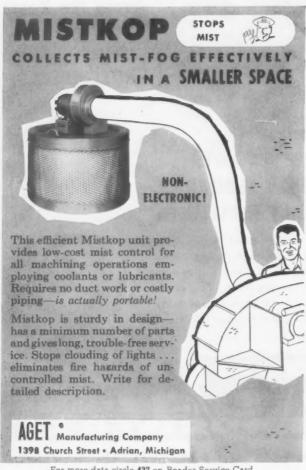
Edward P. Gillane, president of Pratt and Whitney Company, West Hartford, Connecticut and chairman of the board of Potter and Johnston

Company, Pawtucket, Rhode Island, named executive vice president in charge of industrial operations, Penn-Texas Corporation.

Robert C. Eckert. Kirk H. Sterling and Francis X. Sullivan recently joined The Lincoln Electric Company's district office in Baltimore, Maryland; Charlotte. North Carolina: and North Haven, Connecticut.

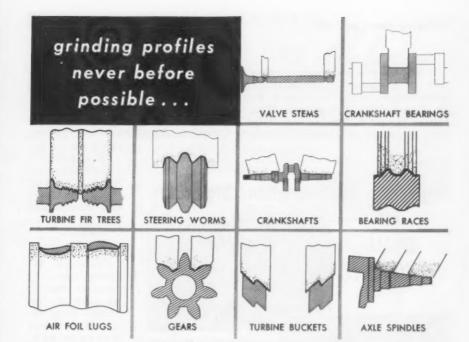
Charles A. Mueller named chief engineer, Gas Process Division, Lindberg **Engineering Com**pany, Chicago, Illinois. K. A. Lang appointed general manager at Downey, California plant. Lester A. Shea appointed Eastern Division manager, Lindberg Industrial Corporation.

October, 1957



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now routinely ground to "tenth tolerance" accuracy HOGLUND CONTOUR WHEEL DRESSERS

Hoglund Contour Wheel Dressers incorporate an ingenious inclined plane mechanism which enables dressing of almost any profile to accuracies of .0001". The dressers feature interchangeable master contour templates. Diamonds are optically pre-set, eliminating dresser adjustment or down-time for replacements. Hoglund Dressers can be hand or automatically controlled. They can be installed on grinders already in service or as original equipment



120 Different Types . .

Adaptable to all grinders including surface, cylindrical, centerless, spline and gear, double spindle, microcentric. PROFITABLE CONTOUR GRINDING . . . For economical solution to tough contour grinding jobs, send your part prints for recommendation and quotation. Catalog and literature yours for the asking.

HOGLUND

ENGINEERING & MANUFACTURING CO., INC. 347 SNYDER AVENUE BERKELEY HEIGHTS • NEW JERSEY

For more data circle 438 on Reader Service Card

October, 1957

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by & /.

industry news in brief . . .

Robert DeDobbelaere appointed district sales manager in midwest and southern area, Abrasives Division, Elgin National Watch Company, Elgin, Illinois. Donald W. MacLeod appointed sales supervisor in charge of Elgiloy.

Philip H. Dreissigacker appointed sales manager in charge of sales and engineering, Farrel-Birmingham Company, Inc., Ansonia, Connecticut.

W. W. Richardson Company, 904 Winston Drive, Melrose Park, Illinois, appointed representative in Illinois territory and Lin Associates, 76 Strathmore Avenue, Brighton,

Massachusetts, appointed
representative in
New England
states, The Cleveland Punch and
Shear Works
Company, Cleveland, Ohio.

Clarence W.
Raufus appointed
assistant district
manager of Cincinnati sales office, Motch and
Merry weather Machinery
Company, Cleveland, Ohio.

Louis A. Gsell, sales manager, National Acme C om p an y, Threading Tool Division, Cleveland, Ohio, recently retired after 47 years with the company.

Allen E. Hermanson appointed manager of Machine Tool Division, in Belvidere and Rockford, Illinois, Sundstrand Machine Tool Company, Rockford, Illinois.



SMALL COST!...



Dickerman 12" Rol-Di-Feed, conventionally mounted on the bolster of a punch press, to feed strip stock from right to left.

Here's a new, versatile feed designed to out-

perform others costing up to 8 times more! The Dickerman 12" Rol-Di-Feed is easily installed on any punch press. This new feed handles with equal ease such different materials as paper, plastic, or cold rolled steel—in thicknesses ranging from .003" to 3/16" in any type of die—piercing, blanking, compound, progressive or draw. The 12" Rol-Di-Feed feeds on the press upstroke and on the downstroke, permitting accurate stock feeds up to 12" per cycle.

Open side design accommodates stock of almost any width. 12" Rol-Di-Feed can be mounted to feed in any direction . . . or installed in pairs to handle unusual sizes and types of stock. For greater production and profits, eliminate costly "special" feeds—install the new standard Dickerman 12" Rol-Di-Feed on all your press equipment!

Dickerman

Send today for literature on the complete Dickerman line.

321-323 Albany St., Springfield, Mass.

For more data circle 439 on Reader Service Card

FINE CUTTING TOOLS

Since 1913 Eclipse has been consistently and conscientiously serving many companies in widely diversified fields of production.

Each of these companies has found that "Engineered by Eclipse" is assurance of genuine quality in end cutting tools.



- High Speed Steel
 Carbide Tipped Cutters
- Core Drills
- Multi-Diameters Back Spotfacers
- Cutters
- Inserted Blade Cutters

and remember . . .

Eclipse now has a complete line of Precision End Mills. Ground from the solid, Eclipse End Mills insure longer tool life, finer finishes and lower production costs.

- Write for Counterbore Cat. No. 51
- Write for End Mill Cat. No. 56



CLIPSE COUN

END MILL DIVISION-NORTH BRANCH, N. J.

*For more data circle 440 on Reader Service Card **For more data circle 441 on Reader Service Card modern machine shop October, 1957

industry news in brief . . .

Edward D. McDonald named sales manager. Madison Industries, Inc., Muskegon, Michigan.

Al La Com appointed general sales manager. Collins Microflat Company, Hawthorne, California.

N. C. Maturevitz appointed exclusive representative in New York state, Precision Service Company, Skaneateles. New York.

The Cameron and Barkley Company, Barkley Building, 1939 Hendricks Avenue, Jacksonville, Florida, appointed distributor in South Carolina and Florida, Niagara Machine Tool Works, Buffalo, New York.

> Blackman and Neutzel Machinery Company, 3713 Washington Boulevard, St. Louis. Missouri. appointed distributor in Arkansas and Kansas.

William B. Tanner appointed advertising manager, Wales-Strippit Company, North Tonawanda, New York.

Basil T. Lanphier named manager of research and Howard O. Beaver promoted to production metallurgist in charge of melting and hot working, The Carpenter Steel Company, Reading. Pennsylvania. Lester E. Cooney appointed assistant to vice president in charge of sales in Chicago, Milwaukee and St. Louis areas: Paul W. Holtz appointed assistant



For automatic screw machines and turret lathes. The lapped finish on the hard knurling surface contributes to outstanding performance and longer life.



We're constantly helping manufacturers solve their special knurling problems. Let us help with yours. Prices for special knurls quoted upon receipt of blueprints or detailed specifications

SPECIAL KNURLS

Made to Order

WRITE FOR KNURL BULLETIN

Specialists in Thread and Form Rolling Tools and Equipment WORCESTER 1, MASSACHUSETTS, U.S.A.

K-163

For more data circle 442 on Reader Service Card

Low cost—high speed hard-facing with the new METCO THERMOSPRAY process Hard-facing pump rod with the Metco Type P Thermospray Gun

High spraying speeds—high deposit efficiencies—simplified application

The advantages of applying hard-facing materials in powder form for lower finishing costs have long been known. But slow spraying speeds, low deposit efficiencies and high material costs have hindered their wide application. Now, with the development of the new METCO Type P THERMOSPRAY GUN and the THERMOSPRAY HARD-Facing Alloys, these disadvantages have been overcome.

The ThermoSpray gun is the first ever developed to operate without compressed air—only oxygen and gas (acetylene or hydrogen) are required. The ThermoSpray Powders are new, self-fluxing alloys of the nickel-chromium-boron type especially developed to provide dense, corrosion-resistant coatings with hardnesses varying from RC-30 to RC-65, depending on the alloy used. The new Gun applies these materials

faster than any previously available equipment (8 to 10 lbs. per hr.), with deposit efficiencies of over 95%. Depending on requirements, coatings may be fused after spraying, used semi-fused with a newly developed *Metco Process*, or left unfused.

Here is your opportunity to do your own hard-facing at low cost. For further information send off the coupon. No obligation, of course.



Metallizing Engineering Co., Inc.

1177 Prospect Ave., Westbury, L. I., New York Telephone: EDGEWOOD 4-1300

In Great Britain: Metallizing Equipment Co., Ltd. Chobham near Woking, England

The following trade names are the property of Metallizing Engineering Co., Inc.: METCO*, ThermoSpray *Reg. U. S. Pat. Off.

Don A. Watson Metallizing Engineering Co., Inc. 1177 Prospect Ave., Westbury, L. I., N. Y.	***************************************
Please send me more information	name
☐ about the New ThermoSpray Gun	company
☐ about ThermoSpray Hard-Facing	street
Please arrange a demonstration in my shop.	cityzonestate

October, 1957

modern machine shop

industry news in brief . . .

district manager in Chicago, Milwaukee and St. Louis Areas: William J. Stephens appointed branch manager in Chicago: M. R. Gerhart promoted to branch manager in St. Louis: Martin J. Holleran named district manager in northern New Jersey; Kenneth C. Largent promoted to branch manager of San Francisco warehouse: Donald R. Ross appointed assistant branch manager in Dayton; and James H. Magee promoted to assistant branch manager in the Cleveland area.

Clarence L. Smith recently retired after 34 years with Norton Company. Worcester, Massachusetts, Irwin W. Peterson succeeds Mr. Smith as Detroit district manager of the Grind-

ing Machine Division of Norton Company. Albert G. Galler appointed field engineer, Teterboro, New Jersey district office. Winfield J. Scott appointed abrasive engineer in the Chicago, Illinois territory. William J. Magee, retired treasurer and director of the Norton Company, recently died at the age of 68

Richard L. Mc-Kee has been promoted to the position of technical editor. Public Relations Branch, The Carborundum Company, Niagara Falls, New York.

Edgar W. Engle has been appointed development engineer, Kennametal, Inc., Latrobe, Pennsylvania.



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In experienced hands...





that's where you'll find...



Power Tools!

ALBERTSON & CO., INC.

SIOUX CITY, IOWA, U.S.A.



ELECTRIC DRILLS . SCREWDRIVERS . SANDERS . GRINDERS . JAPACT WRENCHES . VALVE FACE GRINDING MACHINES . FLEXIBLE SHAFTS . ABRASIVE DISCS . POLISHERS . PORTABLE SAWS.

For more data circle 445 on Reader Service Card

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External Grinder



Milling Attachment



Handlever Tailstock



Handlever Bed Turret



Duplex Turret Tool Holder



Handwheel Collet Attachment



Handlever Collet Attachment



10 in 1 Tool Holder





Ball Bearing Live Center Adjustable Collet Bushing Chuck



Square Turret Tool Block



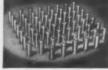
Handlever Double Tool Cross Slide



Telescoping Jaw Follower Rest and Center Rest



Collet Rack



Steel and Brass Collets





Step Chucks and Closers



Centers and Drill Pads



Thread Indicator



Micrometer Carriage Stop



Four Position Carriage Stop

SOUTH BEND

Lathe Attachments

- Cut Production Time
- . Simplify Difficult Jobs
- Increase Lathe Versatility
- . Speed Up Tooling
- Perform Special Classes of Work
- Reduce Operator Fatigue

Write for Catalog 5700

SOUTH BEND LATHE

Building Better Tools Since 1906 SOUTH BEND 22, INDIANA



Four Position Cross Slide Stop



Dial Indicator Carriage Stop For more data circle 446 on Reader Service Card



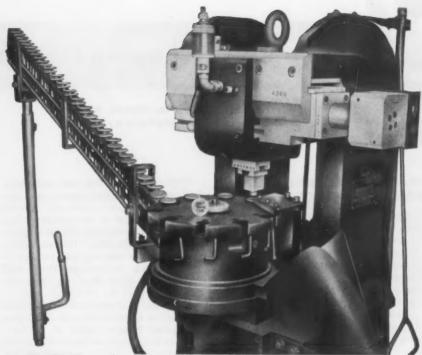
Coolant Pump



Universal Table

modern machine shop 186

October, 1957



3600 marking operations per hour

This machine, equipped with a Dial Feed, marks 3600 automotive engine valves per hour. The Dial picks up valves from the inclined chute, positions them for marking, marks and discharges them into the funnel. The Dial Feed is hydraulically operated through the machine circuit.

This is only one member of the extensive and ever-growing line of marking

GEO. T. SCHMIDT, INC.

1806 West Belle Plaine Avenue Chicago 13, Illinois devices. Whatever your marking problem may be, you can be sure of a rapid and entirely satisfactory solution from

Write today, without obligation, for further information, or for an appointment with a helpful Sales Engineer.

"IF IT'S WORTH MAKING, IT'S WORTH MARKING"

For more data circle 447 on Reader Service Card

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modern machine shop

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new shop equipment

new shop equipment

Descriptions of new machines, tools and materials for metalworking.

TRANSFER MACHINE SIMPLIFIES PART EXAMINATION

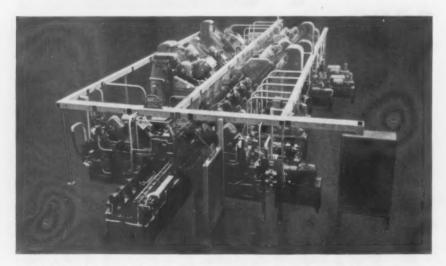
One hundred twenty cylinder blocks per hour are processed through the 21 stations of the Natco Holeway Transfer Machine, which is a product of National Automatic Tool Co., Inc., Richmond, Indiana. This Natco Transfer Machine is shown in the accompanying illustration.

Parts may easily be removed by dropping the guide rail at the stations which operate on one side only.

With pan face up, all necessary drilling and milling operations are completed on faces presented. A total of 56 operations is performed as the parts progress through the stations—namely; one loading, 13 machining, three idle, one rotating, one inspection (plugs check for broken drills and depth), one chip dumping and one unloading.

Since the part must be located from the top, it is elevated over fixed pins up against locating pads.

For more data circle 91 on Reader Service Card



Natco Holeway Transfer Machine designed for processing 120 cylinder blocks per hour

189

new shop materials

and shop materials

Edited by L. L. BALDHOFF

DRILLING MACHINE FEATURES 10 INCH OVERHANG

Substantial cost reduction and greater adaptability is said to be made possible by the Model 1F High Speed Sensitive Drilling Machine with a 10 inch overhang, product of Edlund Machinery Co., Cortland, N. Y. Designed to meet the needs for high speed, sensitive drilling of small parts and assemblies, this machine is particularly adapted to higher production, longer runs and larger work.

Combining a 10 inch overhang with the same features of the smaller overhang drilling machine, the 1F allows for greater adaptability and makes a bigger job application possible. Available in standard or special purpose combinations this drilling machine can be adapted to meet all requirements. Machines of from one to six spindles, with speed ranges from 625 to 10,000 r.p.m. make it adaptable to the needs of high speed sensitive drilling of parts and assemblies.

Positive control of speeds to match the particular job cutting requirements is obtained by simply turning a knob conveniently located on the upper column and, as the machine does not have to be stopped to change belts or gears, hours of valuable production time are saved and economies effected.

Quick accurate selection of speeds is made possible by the Vari-Speed

Drive which, through a variable diameter vee pulley system, delivers smooth, instantly variable speed action up to the full range of the machine. Control knob operation is simple, positive and trouble free, using variable speed techniques. Exact spindle speed is always shown in the speed indicator window next to the control knob, and selection of the exact speed for the particular cutting job, based on the type of drill and material being cut, effect savings in labor and material.

For more data circle 92 on Reader Service Card



Edlund Model 1F Sensitive Drilling Machine

PRESS BRAKE HAS 8 FEET 6 INCHES BETWEEN HOUSINGS

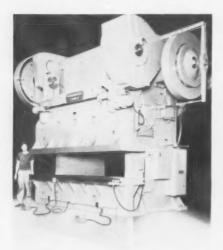
The Cincinnati Shaper Co., Cincinnati 25, Ohio, has announced its Series 40 Press Brake, which has 8 feet 6 inches between housings with an overall die surface of 12 feet.

Both the bed and ram are permanently widened to 28 inches for mounting heavy corrugating and punching dies.

dies.

The stroke is 8 inches and the shut height is 22 inches. This machine is equipped with a power take-off from the main shaft for driving automatic feeding and withdrawal units.

Other features of the Cincinnati Series 40 Press Brake include airelectric clutch control and all steel, interlocked construction. Two speed, totally enclosed transmission permits operation at 5 to 20 strokes per minute. For more data circle 93 on Reader Service Card



Cincinnati Press Brake has & inch stroke

REMOTE CONTROL SYSTEM FOR TRACER LATHES

A remote control system, making it possible to operate Series 62 lathes with air-gage tracer equipment from a distance of twelve feet or more under perfect control, has been announced by The Monarch Machine Tool Co., Sidney, Ohio. Designed for special turning applications, such as machining radioactive materials, contouring solid propellants for rockets and missiles, or wherever it is desirable to position the operator at a distance from the machine, the new remote control system consists basically of an electrical control cabinet and operating panel, plus a separate auto cycle control stand, both connected to the machine by flexible conduit.

The lathe's main drive motor can be started, stopped, or reversed; the spindle can be jogged, run, braked, or shifted to a second preselected turning speed; and feed rates may be varied according to workpiece requirements—all from the remote position. Actual tool movements are regulated during operation by the air-gage tracer mechanism mounted directly on the machine, with the complete cutting cycle, including traverse return, under

fully automatic control.

Since there is no practical limit to the length of conduit which may be used to link the lathe with its control equipment, this equipment can be located in an independent area, if required. The separate auto cycle control stand, however, may be moved close to the machine for setup and then moved away again during the cut. Loading and unloading also are carried out at the machine.

The Series 62 lathe itself is a standard Preselector Dyna-Shift model, equipped with an hydraulically actuated tool slide. This slide is electrically geared to the remote control panel by Selsyn units, and mounts a

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е



For more data circle 448 on Reader Service Card

large dial indicator which can be used to read slide movement. The electrical gearing of the tool slide is so sensitive and accurate that the tool may be positioned within 0.0001 inch, even from the remote position.

Controls mounted on the operating panel of the electrical control cabinet include the main drive motor start, stop, and reverse push buttons, a selector lever for spindle control, and a drive motor horsepower meter.

For convenience in setup, both the drive motor push buttons and the spindle selector lever are duplicated at the machine. As a safety measure, however, the remote start and reverse push buttons for the drive motor incorporate a lock-out arrangement, preventing their actuation while the op-

erator is at the lathe for either setup or work change purposes.

Located on the separate, and portable, auto cycle control stand are: an energizing switch and pilot light; a cycle stop button which, when depressed, stops the automatic cycle at any point; the cycle reverse button which functions as an emergency control by returning the lathe carriage to the "start" position at any time during the cycle: and a potentiometer feed control offering an infinite variation in the feeds that can be selected during the cut. Also included in this control grouping is a large feed meter, reading in inches per minute. This meter not only facilitates accurate



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DRILLING & TAPPING
TURRET HEAD

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You get precision tapping at high speed by simply attaching the QUADTAPPER to any of the four spindles of the QUADRILL. Write today for complete information on both these production tools.

CHICAGO QUADRILL

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1854 BUSSE HIGHWAY . DES PLAINES, ILL.

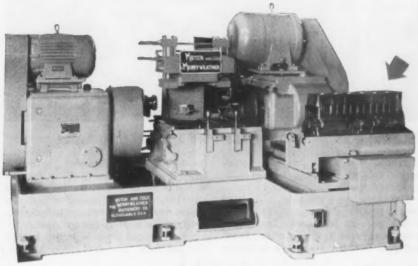


FOR USE ON QUADRILL ONLY

For more data circle 449 on Reader Service Card

191

M4M develops another specialized machine



Special Duplex Milling Machine

more than doubles milling production on cylinder blocks A prominent automotive manufacturer—comparing this M&M machine with previous equipment used to mill ends of cylinder blocks—reports:

In addition to boosting production from 22 to 50 blocks per hour, this M&M machine has greater strength in planetary milling unit, gives longer cutter life and more accuracy. Its extreme rigidity permits rough and finish operations in one pass of the beads.

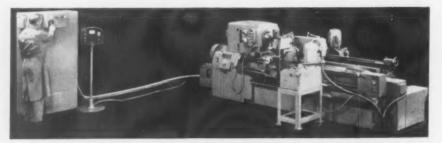
An operator positions the block in the fixture where it is automatically clamped. The right hand head feeds across one end of the block while the left hand planetary head profiles the flywheel housing mounting surface. Cutters rapid traverse back, fixture is unclamped and finished block is removed.

Machine Tool Manufacturing Division



Cleveland, Ohio

For more data circle 450 on Reader Service Card



New remote control system for Monarch Series 62 Lathe with air gage tracer equipment

feed adjustment with the potentiometer control, but allows feed rates to be monitored easily during the cycle.

The infinitely variable carriage feeds are provided by means of the lathe's regular leadscrew. Instead of being connected to the standard headend gear box, this leadscrew is driven

by a direct current motor, operating through a gear reduction unit located at the tailstock end of the lathe. Limit switches, the positions of which are adjustable along the front bed vee, limit carriage feed toward the headstock and rapid traverse return toward the tailstock. The tool slide hydrau-

Cuts Tubing to Accurate Lengths in -SPLIT SECOND TIME!

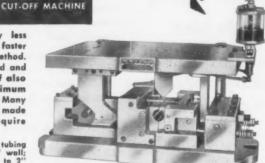
VOGEL TUBE

LENGTHS of 1/2 inch or more are accurately cut to ± .010" with each

stroke of press-actually less than 1/3 of a second or faster han any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening.

Unit No. 12 occommodates tubing up to 1/2" O.D. with 3/32" wall; the No. 2 takes tubing up to 2" O.D. with 1/8" well.

Ask for sample showing how clean-cut your tubing can be sheared with this machine.



TOOL AND DIE CORPORATION 1823 NORTH 32nd AVENUE, MELROSE PARK, ILLINOIS

. For more data circle 451 on Reader Service Card

lic power is supplied by means of an independent hydraulic pump and reservoir unit mounted on a movable type stand.

For more data circle 94 on Reader Service Card



GAGE FOR PRECISELY SETTING CUTTING TOOLS ON MACHINES

A gage for precisely setting cutting tools on machines has been announced by Brown and Sharpe Manufacturing Co., Providence, R. I. This No. 624 Planer and Shaper Gage, in addition to its unusual stability, has beveled ways which are said to eliminate side play and provide accurate alignment and parallelism between the working surfaces.

With an extension that is usable on three surfaces, the No. 624 has a



Brown and Sharpe Planer and Shaper Gage

range of from 1/4 inch to 10 inches. It incorporates a precision level and the platform has an extra tapped hole to accommodate a post for indicators and other accessories. The base and slide of the gage are steel forgings. These forgings and the extension are hardened and ground so as to provide for unusually long life.

For more data circle 95 on Reader Service Card



DOVETAIL ADAPTER Model No. 116





Hand or Press Style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: 1/32" up to 1/2" figures and letters. Write for Bulletin MS23H.

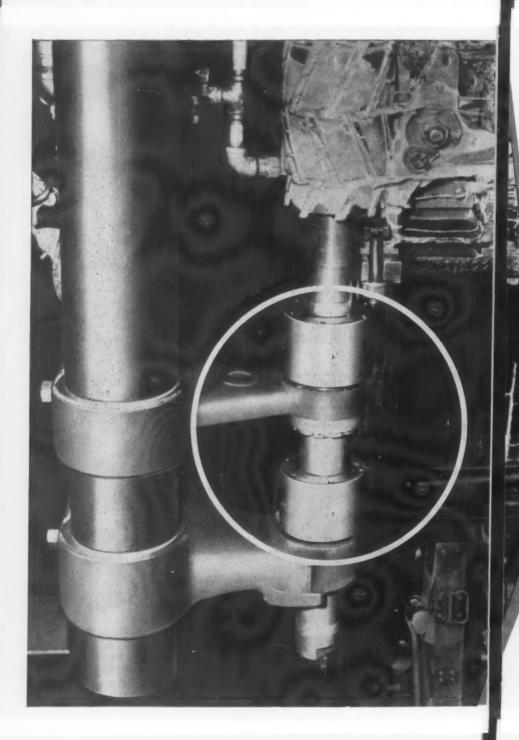
NUMBERALL STAMP & TOOL CO. HUGUENOT PARK STATEN ISLAND 12, N. Y. SINGLE or MULTIPLE LINE TYPEHOLDERS with Dove Tail Shank allow Quick Changing of Type without taking holder out of the Press. Write for Bulletin MS 116

For more data circle 452 on Reader Service Card

October, 1957

modern machine shop

TYPE



Bearings, Inc.

and maintenance costs - improve accuracy! helps milling machine operators cut tool

By replacing the usual bronze split-tapered bushing found on the outer support arm of most milling machines with the new Jergens Milling Machine Anti-Friction Bearing—many benefits are immediately apparent! At a large Central Ohio manufacturing company greater arbor rigidity, elimination of twisted arbors, frozen bushings and chatter was reported.

Maintenance costs are reduced \$25 per machine, per month, according to our customer. Cutter breakage is no longer a problem and the milling machine operator is able to hold closer tolerances, it was reported.

This is only one of many bearing products, designed to improve performance and reduce costs, that we are author-

ized to distribute. For complete information and expert knowledge of all bearing applications call the branch nearest you today!

Providing bearing service in the territories adjacent to our branches, listed below.

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OHIO: Akron e Canton e Cincinnati e Cieveland e Columbus e Dayton e Elyria e Hamilton e Lima e Mansfield e Toledo e Youngstown e Zanesville INDIANA: Ft. Wayne e Indianapolis e Muncie e Terro Haute PENNSYLVANNA: Erie e Johnstown e Philadelphia e Pittsburgh e York WEST VIRGINIA: Charleston e Huntington e Parkersburg e Wheeling NEW JERSEY: Camdon e MARYLAND: Battinore

DELAWARE: Wikmington •
Subsidiaries: Balanrol Corp. • Buffalo, N. Y.•
In the South • Dixie Bearings, Inc.

For more data circle 454 on Reader Service Card

TURRET PUNCH FEATURES MICROMETER GAGING AND BURR FREE PUNCHING

A four ton, 12 station hand operated turret punch press, which will pierce and blank holes from 1/16 inch to 2 inches in sheet material, has been announced by O'Neil-Irwin Manufacturing Co., 576 Eighth Ave., Lake City, Minn. Designed for use in model shops and for short run production, the Di-Acro Turret Punch Press has as standard equipment micrometer type back and side gages. These gages-called Micro Twin can be set at any point from maximum adjustment to the center of the smallest punch in 60 seconds.

Because clearance as small as 0.002 inch is offered on the punches and

dies used in this turret punch, it is claimed that holes can be punched in thin sheet material without distortion or burr. Also, stripper plates are provided as standard equipment for each of the 12 stations.

A wide selection of round, square, oval, rectangular and notching punches and dies is available for use with the machine. A choice of six different clearances is available in the punch and die sets so that the user can specify the die set which will give him the most accuracy for the type and thickness of material punched.

In addition to punching sheet metal, the Di-Acro Turret Punch Press can also be used with

Introducing the new FEDERAL "55"



No. 55 Flywheel type 56-ton capacity

Federal Press Company 704 Division St., Elkhart, Ind.

WRITE FOR NEW CATALOG.

PRESSES

32 Years of Quality Construction For more data circle 455 on Reader Service Card

You eliminate **60% WASTE**

PROVEN METCUT

TWO-PIECE CORE DRILLS

Quick-Change Replaceable Tips Cut Costs, Save Set-Up Time

Tested and proved over a two-year period, METCUT Pin-Mount Core Drills offer you substantial savings. Now you don't need to throw away 60% of your drills because they are not long enough to get through the bushings and work. You simply buy replacement cutters and re-use the tool bodies over and over again. You also save set-up time because cutters can be quickly and easily changed without re-adjusting spindles. You merely unscrew the retaining cap screw, remove the worn cutter, and place in the new tip. No drifts are required.

Sturdy Pin-Mount Design, Deep Flutes Equal Solid Drill Performance

Furthermore, cutting efficiency of the METCUT Core Drill is equal to solid drills. The deep flutes have as much as 60% more chip capacity than ordinary two-piece drills and permit single pass, straight-through drilling on deep holes. Sturdy pins provide accurate alignment and powerful drive. Flush fit eliminates problems of chip lodging or packing.

WRITE FOR BROCHURE . . . New brochure gives details and specifications on this cost-cutting tool. Ask for quotations. Sizes from 34" to 5" diameters are now available.



steel for a leading tank manufacturer, eliminates 60% tool waste. Replaceable cutters give big savings because 60% of core drill is needed to get cutting edge through the bushings and work.

Industry's Finest Standard & Special Cutting Tools













Carbide Tipped

Clutch Drive Counterbores Stub Taper

Special End Counterbores Cutting Tools Spotfacers

METAL CUTTING TOOLS, INC., 350 S. Water St., Rockford, Illinois For more data circle 456 on Reader Service Card

October, 1957

modern machine shop

such material as fiberboard, masonite, asbestos, gasket material, paper cork, leather, rubber, plastics, screen and mesh and other special sheets.

The four ton capacity of the machine enables a 2 inch hole to be punched in 16 gauge mild sheet steel; a ¼ inch hole in 3/16 inch steel plate. Other specifications include: depth of

throat 12 inches, overall height 25 inches, width 30 inches, and depth 20 inches.

For more data circle 96 on Reader Service Card

* * *

SEMI-AUTOMATIC INTERNAL CONTOUR GRINDER

Parker-Majestic, Inc., 147 Joseph Campau, Detroit 7, Mich., recently introduced its Semi-Automatic Inter-

nal Grinder. The heart of this machine is a cam follower workhead wherein a cam and cam follower are installed at both ends of the head. This prevents twist or bind and insures smooth action.

A cam is used to control the grinding wheel infeed. When rotated by means of a ratchet mechanism through 360 degrees, the cam completes a cycle consisting of rapid in-feed for roughing, dwell for wheel dressing and a slow in-feed for finishing.

Sizing is accomplished through the use of a micrometer type wheel dresser which, when once positioned, enables each succeeding workpiece that is produced to be repetitively identical.



Newly painted electronic parts at Lenkurt Electric Co. are wheeled into a Despatch RS-5 Oven for fast, forced drying.

Freshly painted transformers and filters are dried 6 times faster at this San Carlos, Calif. plant. Using a Despatch RS-5 Oven, Lenkurt Electric Co. bakes sensitive electronic components at 125° F. in 1/6th the normal drying time.

The constantly accurate temperature control system of Despatch Ovens assure uniform temperatures at all times. Lenkurt also uses their RS-5 Oven for hard baking operations at temperatures up to 600° F.

Write for illustrated RS Bulletin



DESPATCH OVEN CO.

381 Despatch Bldg. Minneapolis 14, Minn.

For more data circle 457 on Reader Service Card



One R and L TURNING TOOL of a similar size (No. 1) costing only \$87.50 will take the place of the above assortment of tools!

Write for complete catalog of R and L Tools



OTHER FAMOUS R and L TOOLS:

TURNING TOOL - CARBIDE OR ROLLER BACKRESTS - RELEASING OR NON-RELEASING TAP AND DIE MOLDERS, (ALSO FUNNISMED FOR ACORN DIES) UNIVERSAL TOOL POST - CUT-OFF BLODE HOLDER - RECESSING TOOL REVOLVING STOCK STOP - FLOATING DRILL MOLDER - KNUMLING TOOL

For more data circle 458 on Reader Service Card

Table movement is energized by any one of three built-in methods: namely (1) hand feed using the capstan type hand wheel; (2) power feed through a gear driven mechanism electromechanically controlled for the full table travel of 12 inches; and (3) re-



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SOCKETS

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HEAT TREATED...

So popular with users.

COLLIS Heat Treated Sleeves and Sockets are manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures same accuracy with longer runs.

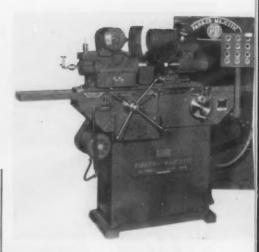
Call at once for our representative to explain about the Complete Collis Line of Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sleeves and Sockets and Collets.

"Call Collis for Service"

THE COLLIS CO

DEPT. A, CLINTON, IOWA

For more data circle 459 on Reader Service Card



Parker-Majestic Internal Contour Grinder

ciprocator mechanism where the stroke is adjustable from 0 to 3 inches.

The Parker-Majestic Semi-Automatic Internal Contour Grinding Machine is very adaptable. It is a simple matter to change the workhead cam, thus enabling the grinding of many different internal forms. This feature is particularly desirable when relatively short run production on several parts is demanded.

For more data circle 97 on Reader Service Card

GRIND THE

Eastern Centerless Way

Our new plant with increased facilities

PROMPT SERVICE
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford & Conn.

For more data circle 460 on Reader Service Card

October, 1957



THE SHEFFIELD VISUAL GAGE is a rugged comparator that assures gage block precision in your shop, in your tool room or in inspection. It checks all external dimensions including screw thread characteristics—the most versatile, the most shop-proof gage of its kind.

Now, in order that you may know its true value, we are suggesting that you use it for 10 days without obligation. Just call your local Sheffield representative and ask him to bring a Visual Gage. In ten days he'll pick it up again—if you can part with it. Or address your request to The Sheffield Corporation, Dayton 1, Ohio—Dept. 12.

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manufacture and measurement for mankind

of Bendix Aviation Corporation

For more data circle 461 on Reader Service Card

October, 1957

modern machine shop

202

BABY GUSHER MOLTEN METAL PUMP

The accompanying illustration shows a small vertical centrifugal gusher pump, the Model 9025-M, built for handling molten metals, such as solder, tin, zinc, lead and so on at temperatures up to 700 degrees Fah-

renheit. The unit is available from The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio, with either 1/4 h.p., 1,140 r.p.m. or 3/4 h.p., 1,725 r.p.m. Class "B" insulated motor, for capacities up to 7 gallons per minute and heads up to 8 feet.

A safe operating temperature of the motor is maintained by utilizing three aluminum cooling fans, which rotate simultaneously with the heavy one

> piece extended stainless steel shaft. Two generous size precision ball bearings. packed with high temperature silicone grease, are confined within the motor. This eliminates the necessity for bearings or metal contacts in the high temperature area. For more data circle 98 on Reader Service Card







Ruthman

I,000 G.P.M. Micronic Filtration

THE



Filter-Matic

Tubular Screen

VACUUM FILTER

You get micronic filtration at high flow rates in the compact Delpark Filter-Matic. Designed for minimum space, the Filter-Matic combines highly efficient filtering elements with fully automatic self-cleaning mechanisms. The filtering elements are permanent and eliminate the usual expense of filter media. Clean coolant flow from the filter is not interrupted during the cleaning cycle. Requires minimum attention. Capacities range from 5 G.P.M.





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INDUSTRIAL FILTRATION COMPANY

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For more data circle 463 on Reader Service Card

October, 1957

modern machine shop

204

DYNAMIC BALANCING MACHINE

A multi-purpose line of dynamic balancing machines that are used in four different ways to correct vibration and unbalance problems has been announced by International Research and Development Corp., 797 Thomas Lane, Columbus, Ohio. The balancing

machines—available in three models, 101, 102 and 103—are four way versatile in that they are (1) used for dynamic and single plane balancing of motors, spindles, turbines, impellers, flywheels, blowers and so on, yet the electronic console of the balancing machine is readily disconnected for portable use, (2) to check vibration tolerances of assembled machinery, (3) to pinpoint the causes and analyze all frequencies of vibration and (4) for

'inplace" or portable balancing.

The machines are intended for production balancing - where fast, simple operation is important; for plant maintenance where quick, easy setup is required: and for motor repair and balancing service shops where versatility and capacity range is essential.

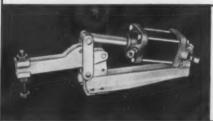
The electronic console of the balancing machine consists of any of the various models of portable IRD Vibration Analyzers. Angle of unbalance is observed on the workpiece under a brilliant white stroboscopic light. Amount of unbalance is observed directly on a meter of the analyzer. Two adjustable workpiece supports contain





You asked for it ...

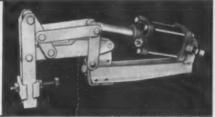
KNU-VISE has come up with it!



TWO NEW
AIR-OPERATED CLAMPS
with 800 pound
clamping force

AO-800 CLAMP

AODT-800 DOUBLE TOGGLE CLAMP



Because you asked for it, Lapeer's vast line of Knu-Vise clamps now features four distinct groups of air-operated clamps. Two new 800 lb. air clamps have been added to the widely accepted 200, 400 and 1200 lb. air clamps, thereby rounding out the Knu-Vise series. The Model AO-800 clamp is for conventional holding operations—the Model AODT-800 for those difficult mounting situations.

For complete information on these units and the more than 150 other models available, write for catalog today!

Manufacturers of over 150 models of manually and air-operated clamps and pliers

KNU-VISE PRODUCTS

LAPEER MANUFACTURING CO.

3048 DAVISON ROAD

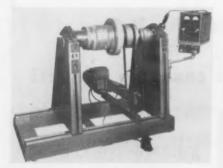
LAPEER, MICHIGAN

WESTERN DIV.: 422 Magnolia, Glendale, Calif. • CANADIAN DIV.: Higginson Equipt. Sales Ltd., Hamilton, Ont.

For more data circle 465 on Reader Service Card

October, 1957

modern machine shop



IRD Multi-Purpose Dynamic Balancer

dynamic pickups to convert the transverse motion of the workpiece to electrical signals. The workpiece is belt driven from an electric motor through a jackshaft to control belt tension. The workpiece may be mounted either

between bearing supports or in an outboard manner.

An electrical plane separation system is incorporated for eliminating cross effects when balancing in two correction planes. Production balancing of similar rotors is thus accomplished in only one run.

Rotors weighing 5 to 300 pounds are handled on the Model 101, from 50 to 1,000 pounds on the Model 102, and from 250 to 2,500 pounds on the Model 103.

For more data circle 99 on Reader Service Card

* * *

REAMER DRIVER FEATURES FOUR SPEEDS

A bench mounted reamer driver, with capacity for reamers of ¼ to 1½ inches in diameter, has been developed by The Greaves Machine Tool Co., 2700 Eastern Ave., Cincinnati 2, Ohio.









"Doc! It's like fighting DERMATITIS with an armored glove."

Except WEST protective gloves are invisible:

- quickly applied

-comfortable to wear

- easily washed away.

For skin exposed to oils, dust, grease and grime:

- use PROTECTIVE CREAM #211.

For skin exposed to acids, alkalies and inorganic chemicals;

- use protective CREAM #311.

For skin exposed to organic solvents, acetates and cutting oils:

- USE PROTECTIVE CREAM #411.

West PROTECTIVE CREAMS protect against hundreds of troublesome industrial irritants. They're antiseptic. Inhibit harmful bacteria with Hexachlorophene. And they protect for extended printed of time.

"We've found a simple way to control dermatitis"

"Our men all know how West's Antiseptic Protective Cream #211 guards their hands against abrasive dusts and other potential skin irritants in our plant. Applying this protective cream regularly has become a simple routine with them. As a result, this precaution has virtually eliminated outbreaks of dermatitis," says MR. HENRY BACKUS, Personnel & Safety Director for the Midwest Abrasive Company, Owosso, Michigan.

"We find that West's Antiseptic Protective Cream #211 does not harm or stain clothing and may be used around the year in complete comfort."

Would a similar program interest you? Send the coupon.

LARGEST COMPANY OF ITS KIND IN THE WORLD



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Please send your 24 page booklet "The Control of Dermatitis in Industry."

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Position.....

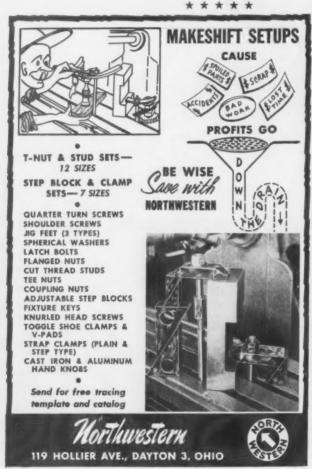
For more data circle 467 on Reader Service Card

October, 1957

modern machine shop

This unit has four speeds-20, 32, 56 and 85 r.p.m.—with higher speed ranges available on special order. Foot switch operation leaves the operator's hands free to control the work, and convenient bench height facilitates handling, thus affecting time savings and reducing labor costs. Steady, low speed rotation of the reamer driver assures smoothly reamed holes. Release of pressure on the foot switch stops rotation of the chuck at any desired time.

The reamer driver has a 4 inch four jaw universal chuck and a three iaw chuck is offered as optional equipment. The motor is wired for 110 volt alternating current. All mechanism, including the motor, is fully enclosed. Gears run in oil, assuring constant



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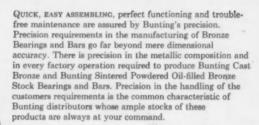
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Bunting

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL.

The Bunting Brass and Branze Company • Toledo 1, Ohio • Branches in Principal Cities
For more data circle 469 on Reader Service Card

October, 1957

Bunting feature.

All Bunting Sintered Bronze Plain

and Flange bearings stamped with part number—on exclusive

modern machine shop

lubrication and smooth operation. Bronze bearings and ball thrusts enable this rubbed unit to deliver extra long, trouble free service.

Overall measurements of the Greaves Reamer Driver, including chuck, are 12¾ inches wide, 21¼ inches long



For more data circle 470 on Reader Service Card



Our quantity production of standard-size, precision, stainless-steel pins is now expanded to miniature pins. Tolerances are held to .0002 on dia. Sizes run as small as .020 dia. $\times Y_6$ ". Both straight and toper styles are produced, with taper pins ranging down to 9/0. We specialize on stainless-steel, instrument-type pins. Send your blue-prints for prompt quotation.

THE PEASLEE METAL PRODUCTS CO.

470 Tolland Street ● East Hartford 8, Conn For more data circle 471 on Reader Service Card

212 modern machine shop



Greaves Reamer Driver for bench mounting

and 93/4 inches high. Weight is 125 pounds and equipment is complete, including motor, chuck and foot switch.

For more data circle 100 on Reader Service Card



ELECTRONIC COMPARATOR PERMITS CALIBRATING BY USERS OF GAGE BLOCKS

Cleveland Instrument Co., 739 Carnegie Ave., Cleveland 15, Ohio, recently announced its Micro-Ac Electronic Microcomparator for ultra precision gaging by users of gage blocks. The new amplifier and gaging stand have been designed for laboratory precision and are rugged enough for production use — measurements to one millionth of an inch are simple and can be made with the minimum of skill. It is recommended for use where maximum accuracy and reliability are required, such as gage block calibration, thread wire, servo pistons, and balls.

CENTERLESS GRINDING

Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.

For more data circle 472 on Reader Service Card



Proof of Precision: This 100,000th Spindle

... that's right. Ex-Cell-O has produced more than 100,000 precision grinding and boring spindles. They are in use today throughout the world, on a wide variety of important jobs. No other spindle manufacturer has so solid a record for satisfaction-so sound a reputation for building the best.



EX-CELL-O FOR PRECISION (XL)

Machinery Division

RAILROAD PINS AND BUSHINGS . DRILL JIG BUSHINGS . AIRCRAFT AND MISCELLANEOUS PROD For more data circle 473 on Reader Service Card

October, 1957

modern machine shop



HIGH SPEED

PRODUCTION DRILLING

OF VERY SMALL HOLES . . .



Electro-Mechano 8" drill presses include all those features which years of experience have proven to be best for profitable operation in the drilling range of .004" to 5/32".

Write NOW for Descriptive Bulletin!

The ELECTRO-MECHANO CO. 265 E. Erie Street MILWAUKEE 2, WISCONSIN

For more data circle 474 on Reader Service Card
214 modern machine shop

new shop equipment . . .

According to the manufacturer, use of the Model MA-1720 Micro-Ac Microcomparator eliminates delays inherent in out of plant calibrating; increases utilization factor of present gage block sets; reduces calibration and inspection cost; insures properly calibrated blocks at all times; and reduces total gage block investment.

A gage head, amplifier and stand make up the complete microcomparator. Dimensional changes at the gate tip are displayed on the meter magnified up to 100,000 (10 millionths of an inch change moves the meter pointer one inch). In use, the gage head is zeroed to the master dimension. The meter then shows how far off-size the gage block, or part, is from the master dimension.

All controls are designed and located for ease of adjustment and operator convenience. A full line of accessories is available which covers every type of special high precision measurement.

For more data circle 101 on Reader Service Card



Cleveland Micro-Ac Microcomparator

Cutting Tool and Gaging Methods...by (BESLY)



"ROLLING" THREADS IN COPPER-

Steel Industries, Inc., Crawfordsville, Ind., sets up to thread 1500 small, difficult-to-tap copper parts per hour. H. M. Oshry, Vice-Pres., states, "The Besly "X-Press' tap (shown) made it possible to get this high production."



MODIFIED TO FIT—At the Gabriel Co., Cleveland, a small Besly tap fitted inside the bored-out tap center of a larger Besly tap accurately threads two concentric holes simultaneously in die-cast pistons in 9 seconds—half the former time.



PRECISION ACCURACY-

Asked why he uses Besly-Metro gages to check for accuracy, A. Wermund of Bodine Electric Co., Chicago, says, "Last longer sturdier built."



CARBIDE TOOLS IN ACTION—Steel truck wheels made by Gunnite Foundries Corp., Rockford, Ill., rough bored with Besly BL-12-B5 Standard Carbide Tipped Tool, arrow 1, removing 1/8" to 3/8" of stock. On same set-up second Besly AL-12-B5 Standard Carbide Tipped Tool, arrow 2, semi-finish bores, removing .030". Metal removal is at 200 S. F. M. at .016" feed.

Prove to yourself that Besly Cutting Tools and Gages produce better results. Put them on trial on your toughest jobs, and check the difference in longer tool life, less down time, fewer rejects and faster production. If you'd like to try Besly tools or use Besly's Engineering Service, see your Besly distributor for details, or write us...

Engineering, Service and "Specials"... are a Besly Specialty



BESLY-WELLES

CORPORATION
Est. as C. H. Besly & Co. 1875

108 Degrborn Ave., South Beloit, Illinois

TAPS . DRILLS . REAMERS . END MILLS . TOOL BITS . GAGES CARBIDE TIPPED TOOLS, BLANKS, TOSS-AWAY INSERTS and HOLDERS

For more data circle 475 on Reader Service Card

October, 1957

modern machine shop 2



TYPE GC

INDUSTRIAL ROLLER BEARING

STANDARD SIZES ARE SHOWN IN OUR GENERAL CATALOG SENT UPON REQUEST. SPECIAL SIZES TO ORDER

ANY QUANTITY, "ONE BEARING OR MANY"

THE GWILLIAM COMPANY

Incorporated 1912

358 FURMAN ST.

BROOKLYN 1, N. Y

......... For more data circle 476 on Reader Service Card new shop equipment . . .

PLASTIC COVER FOR CENTERLESS LAPPERS

To provide maximum protection for the exposed working parts of its centerless lapping machines, Size Control Co., 2500 W. Washington Blvd., Chicago 12, Ill., has developed a rigid plastic hood. Now included as standard equipment with the firm's new machines, the hood is also offered to present lapping machine owners.

The hood is molded of rugged polystyrene and then finished with a heavy steel band, affording unusual strength and protection against dust, dirt and moisture. The hood is said also to provide substantial protection to the working parts from possible damage caused by the accidental dropping of a hand tool.

For more data circle 102 on Reader Service Card

T. H. LEWTHWAITE MACHINE CO.

317 East 47th St. . New York 17, N. Y.

Correct clearance between the punch and die for both type and thickness of metal being punched is essential for efficient and clean punching. Our large, planned stocks were built with this in mind.

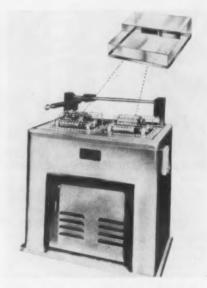
Send for new catalog sheets on our complete line, which include charts and instructions on figuring clearances.

Using the right tools for the specific work will enable you to get the full benefit of the exceptional durability of

Lewthwaite



For more data circle 477 on Reader Service Card modern machine shop



Plastic Hood for Size Control Centerless Lapper protects exposed working parts

October, 1957

new shop equipment . . . Wis. Easy installation, low maintenance, fast acting and simple positive



For precision cutting...

TRANSPARENT SUNICUT OILS ASSURE YOU GOOD VISIBILITY, PEAK PRODUCTION



Transparent Sunicut oils assure excellent finish in critical operations at close tolerances...good visibility speeds production.

Transparent Sunicut® oils including heavyduty and dual-purpose oils, are available in many grades to suit your specific needs. They give outstanding results...especially where precision cutting is required.

Their transparency takes the "blinders" from work that needs close watching, permitting close product control, faster production, lower unit cost. Machine operators like Sunicut's "cleanliness." Most important, transparent Sunicut oils assure you of good finishes.

For full information about Sunicut cutting oils, call your Sun representative, or write to Sun Oil Company, Philadelphia 3, Pa., Dept. MM-10.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

Philadelphia 3, Pa.

In Canada: Sun Oil Company Limited, Toronto and Montreal

For more data circle 478 on Reader Service Card

October, 1957



Sun Oil Company





STATIONARY MAGNET CLUTCH FOR WET AND DRY **APPLICATIONS**

The Style "GS" and "GSW" Electro-Magnetic Clutch for dry and wet applications respectively has been announced by Stearns Electric Corp., 120 North Broadway, Milwaukee 2,

Wis. Easy installation, low maintenance, fast acting and simple positive adjustment are offered in this clutch. Oversized bearings to insure extra capacity is an important feature of this clutch, and these bearings are factory sealed and should require no lubrication or attention of any kind under normal conditions. Specially selected friction linings for unusually long life are furnished as standard parts of

this clutch and seldom need ad-

justment for lin-

ing wear. When the need for lining wear adjust-

ment is apparent, it is a simple matter to turn three

easily accessible

wear adjusting screws to compen-

sate for lining wear. These same

adjusting screws

also provide a

means for mechanically engag-

ing the clutch in

the event of a

are fast acting

clutches giving smooth engage-

ment and can be

actuated remote

or direct with au-

power failure. The "GS" and "GSW" Clutches

MILLING MACHINE SPACING COLLARS

Save Time ON GANG MILLING SET-UPS

These MICROMETER AD-JUSTABLE SPACING COL-LARS are designed for accurate spacing of side milling cutters, gang milling and various other multiple setups on milling machines. Accurate spacing of the mill-

ing cutters is easily made by merely loosening the cutter arbor nut and making a plus or minus adjustment.

You will be assured of a QUICK, ACCURATE and POSITIVE AD-JUSTMENT at all times.

For immediate delivery specify size and mail orders to

Size of Cutter Arbor	Maximum Outside Diameter	Price
7/8	1-9/16	\$12.75
1	1-13/16	12.75
11/4	2-1/16	13.25
1 1/2	2-7/16	13.25
13/4	2-3/4	16.75
2	3-1/16	19.50

DAYTON ROGERS Manufacturing Company

MINNEAPOLIS 7D. MINNESOTA

For more data circle 479 on Reader Service Card

modern machine shop

Stearns Clutch



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INVEST ONE-TENTH THE COST OF A GOLF BALL . . .

START SAVING DOLLARS IN

Robbins angular tooling equipment often pays for itself the first few times you use it . . . but let's be conservative. Let's talk about writing off the cost over ten years. (About half the useful life of a "Magna-Sine!") Written off in this manner, the Model A-5 Magna-Sine illustrated represents an investment of around twelve cents a day!

This equipment saves dollars of valuable toolroom time on every job. Set-ups that require hours by other methods take just minutes the Robbins way. Set up to machine, grind or inspect any angle in just four simple steps: (1) Look up required angle in Table of Constants furnished with unit, (2) Select gage blocks indicated, (3) Place blocks between base and sine bar swivel block, (4) Secure the work . . . and you're ready to go!

This simple, fast, sure method sets up any angle, single or compound, right or left hand, without V-blocks, angle plates or complicated "build-ups." Complete range of models and sizes puts Robbins precision equipment within the reach of every shop. Write now for literature.



HEAVY DUTY SINE PLATE FOR MACHINING



"MAGNA-SINE" WITH MAGNETIC TABLE



FOR INSPECTION AND LIGHT MACHINING

OMER E.

24800 PLYMOUTH ROAD

COMPANY DETROIT 39, MICH.

Also manufacturers of special machinery, automatic essembly machinery. For more data circle 480 on Reader Service Card

modern machine shop

219

October, 1957

JOHANSSON GAGING EQUIPMENT

tomatic or manual controls such as pushbuttons, limit switches, electric eyes or any other switching device. Direct magnetic action completely eliminates mechanical vokes and shifters that can get out of order. Plug in electrical connections end the need for slip rings or brushes usually found in rotating electrical equipment.

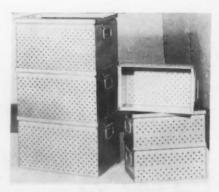
These clutches can be easily adapted to modern machine tools and are available in sizes from 4 to 9 inches in diameter.

For more data circle 103 on Reader Service Card



PERFORATED PROCESSING CONTAINERS

A line of perforated Stackboxes and Stackbins for processing operations,



Perforated Stackboxes and Stackbins

including vapor or liquid degreasing, quenching and similar dipping and cleansing operations, has been announced by Stackbin Corp., 1083 Main St., Pawtucket, R. I. Perforated Stackboxes and Stackbins can be used in conjunction with like size Stackracks and can be interstacked with regular



DI HEAVY DUTY ILL NOSE CENTERS

guarantee perfect alignment

Two double rows of quality bearings in the large and small ends of the nose of this live center are your assurance of perfect alignment on any type of work.

Two shank sizes provide diameters from 1/2" to 71/2" for a wide range of work with a single center.

Write now for complete catalog of all types of ROOFE Live Centers.

Write for our catalog.

HOUSTON GRINDING & MFG. CO., Inc. P. O. BOX 7461 . HOUSTON 8, TEXAS

For more data circle 481 on Reader Service Card

220 modern machine shop

JOHANSSON GAGING EQUIPMENT

Assures You
Precision to the
Finest Degree
to Meet Your
Requirements
—Backed by the
Name Supreme
in the World of
Measurement

GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

(for inside measurements , 155 to 24 inches), Scale range plus or minus ,001 graduated to ,0001 and minus ,020 graduated to ,0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.



MULTIMI

Multiple Interference Microscope The Multimi is an instrument for both scientific and practical measurements through which the possibility has been given to everyone to make use of the great advantages of the interference methods. The accuracy of the Multimi is as high as .04 micro inches, which means an accuracy of about the same value as the atomic dimensions. The fringes are here replaced by what can be classified as lines which constitute real profile curves and contours, exactly reproducing surface shapes of different kinds. The instrument is adapted for photographing the interferogram by a miniature camera. Low reflecting, normal reflecting and high reflecting interference plates are available. It is highly recommended for the following: Surface finish measurements . . . surface finish on quartz plates . . thickness of films and coatings . . . thermal and mechanical deformations . . . cell research, etc.

Write for Literature

C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. . BOX 4086 NORTHEASTERN STATION . DEARBORN 1, MICH.

For more data circle 482 on Reader Service Card

October, 1957

modern machine shop

REIDTOOL NEEDS!

C. I. HAND WHEELS



SOLID WEB

Solid web in dished and straight types. Also counter balanced.

COUNTER BALANCED

Made of fine grain cast iron. Rims and handles ground to high lustre. Many sizes. Low prices.



Made in types shown. Also scalloped. Fine

grain cast iron. No sharp edges. Wide variety of sizes.

C. I. HAND KNOBS



PRONG

FREE 64 Pg. Cat.

Needed in your reference file. Showing plastic and steel ball handies, compression springs and numerous other useful tool room items. Address



LONG SHANK With Wrench Hex.

TOOL SUPPLY CO.
MUSKEGON HEIGHTS
MICHIGAN

For more data circle 483 on Reader Service Card

222 modern machine shop

new shop equipment . . .

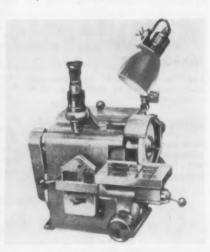
Stackboxes and Stackbins of the same size.

The perforated containers are available in four sizes, from 7½ inches wide by 13 inches long by 6 inches high to 15 inches wide by 19¼ inches long by 11 inches high. Perforations are located on the bottoms and sides; perforated ends are optional. The following size hole openings are standard in perforated Stackboxes and Stackbins: 7/32 and ½ inch holes on 1 inch centers and 7/32 and ½ inch holes on ½ inch centers staggered.

For more data circle 104 on Reader Service Card

GRINDER SHARPENS DRILLS UNDER 1/8 INCH DIAMETER

To meet the demand for conserving skilled worker's time now consumed in drill grinding, Jersey Manufacturing Co., 442 Livingston St., Elizabeth, N. J., has announced the Jemco



Jemco Model SM-3 Drill Grinding Machine

Get more production—and greater accuracy—at lower cost with

MCCROSKY





Super® Adjustable REAMERS



Standard of quality for more than 50 years, McCrosky Super® Adjustable Reamers combine the strength of solid reamers with the longer life, greater accuracy and lower costs of replaceable blade reamers. They cut freely without chatter; avoid any tendency to "dig in", and produce absolutely round, concentric holes with high surface finish. Users report they get more finished pieces—of better quality—in shorter time—at lower cost.

Furnished in machine chucking, shell and hand designs. Carbide tipped, cast alloy or high speed blades. From 1%" to 6" in diameter. Also "step" reamers; tapered reamers; piloted reamers; and multiple operation combination reaming, facing and counter-boring tools to meet any requirement. Get full details. Write for Bulletin 19-R—Today!



Our shop proved screw and pin locking device holds the blades firmly against the bottom and back of the blade slot assuring utmost rigidity. Thrust of the cut increases the locking pressure providing the effect of reaming with a solid tool. Blades can be released easily, and re-ground and re-used over and over again, reducing purchases of new blades to a minimum.



CORPORATION MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

For more data circle 484 on Reader Service Card

October, 1957

modern machine shop

Model SM-3 Drill Grinding Machine for drills 0.012 to 0.120 inch in diameter. According to the manufacturer, the handling of this machine is sufficiently simple so that no difficulty in accurately sharpening drills is encountered even by unskilled workers. The drill is simply clamped into a

holder which accommodates the machine's complete diameter range and checked under a microscope. The special shape of the holder is said to assure the absolute symmetrical sharpening of the drill regardless of the predetermined tip angle, backing off angle or whether the drill is of the right or left hand type.

Wheel dressing is also simplified on the SM-3. Built into this machine is a wheel truing attachment that is op-

> erated by simply controlling the oscillation motion of the guard.

Weighing only 55 pounds, the SM-3 has a three phase 220 volt, 6 cycle motor and is furnished complete with microscope, grinding wheel, built in truing attachment with diamond, one drill holder lighting fixture, and tweezers.

For more data circle 105 on Reader Service Card

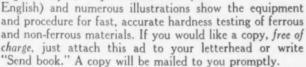
HIGH SPEED DRILL BLANKS

Chicago - Latrobe, 419 West Ontario St., Chicago 10, Ill., is now marketing a complete line of high speed drill blanks are drill blanks are made in corresponding lengths as jobbers', wire and letter size drills and are fin-

GET THE FACTS

About Hardness Testing

Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in



P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of guaranteed accuracy, say the word and we'll gladly supply them.



224

CLARK INSTRUMENT INC.

For more data circle 485 on Reader Service Card

modern machine shop





LONG SHOULDER TYPE -Small toe clamp. Use to keep guide pin in bushing during stroke. Long wearing bronze plated on hardened steel, ½" to 3" pin dia.



NEAVY DUTY—Large toe clamp, for large and heavy die sets requiring extra body and shoulder thickness. Bronze plated 2" to 3" pin diameter.



MUT TYPE—For wide range of requirements. Available in 5 sizes, 1° to 2° pin diameter, long-wearing bronze plated on hardened steel.

GUIDE PINS and GUIDE PIN BUSHINGS

Because high production, quality control and longer die life have become all-important, most stamping plants have now standardized on Lamina guide pins and Lamina bronze-plated bushings.

All Lamina wring-fit bushings are pre-finished on the I.D. Seated on a ground shoulder square with the surface of the die shoe and secured by special retainers, they assure distortion-free, full bearing surface that results in better die alignment, less maintenance and longer die life. Lamina guide pins are special tool steel, heat treated, spray quenched, ground and burnished. The uniform, hard surface resists wear and the tough core prevents bending during installation or use. The pins are dimensionally accurate, do not "mushroom" or get out of round, and require no "running in".

There is a type and size Lamina Guide Pin and Bushing for every need. Our new catalog gives illustrations, applications, dimensions and prices of more than 800 items. Write for free copy,





LONG SHOULDER TYPE—Large clamp Long bearing surface contains pin during entire stroke. 2" to 3" pin diameter Repage on steed

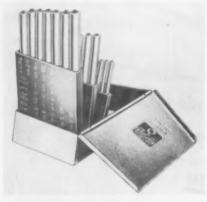


SMORT SHOULDER TYPE—For die space more beering area within die area. Branze en steel or solid Ampco Bronze. 7 lengths, pin sizes ¼" to 2".



RING CLAMP TYPE—For heavy duty and bossed die sets. Bronze-plated steel er Ampco Bronze, 4 lengths, pin diameter 2½" to 4½".

For more data circle 486 on Reader Service Card



Chicago-Latrobe High Speed Drill Blank Set

ished to the same tolerance. These blanks can be used for trying holes, punches, gages and stock for making special tools. The size range is complete in fractional, letter and wire gauge sizes. Sets are also available in metal folding cases, as shown in the accompanying illustration.

For more data circle 106 on Reader Service Card

* * *

VISUAL FORM GRINDER HAS CONTINUOUS LUBRICATING SYSTEM

Continuous lubricating system, timer belt, 110 volt electrical control, close tolerance downfeed control and several other improvements have been incorporated into the Model VG-3 "Visual Grind," manufactured by The Cleveland Grinding Machine Co., 1610 Eddy Rd., Cleveland 12, Ohio. According to the manufacturer, the machine allows for the form grinding of steel and tungsten carbide to precision tolerances without stopping to



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG* process replaces twisted or broken tangs with brand new tangs of correct size—and with GUARANTEED ORIGINAL STRENGTH. No welding—No distortion—No shortening of drills—No sleeves.

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed!. Send for complete information.

* Patent No. 2,512,033

NU-TANGS INC. 1335 Bates Street Cincinnati 25, Ohio

For more data circle 487 on Reader Service Card

400 Standard Cleveland Punches from 5/32" to 11/2"

YOUR orders for any of these 400 standard punches will be filled promptly. Naturally they cost less than special punches. What's more, when you order Cleveland punches you're sure of getting quality tools backed by years of specialized experience. We're constantly experimenting with various steels and processes so that we can give you the very best.

Are your punching machines equipped to use standard Cleveland punches? If not, it will pay you to investigate the many advantages of standardization. For detailed information send for our new Catalog No. 12 today!



POWER PRESSES - FABRICATING TOOLS

City Foundry Division • Small Tool Department

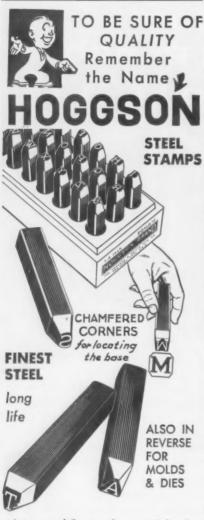
E. 40th & St. Clair Avenue • Cleveland 14, Ohio

Established 1880

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • E. LANSING For more data circle 488 on Reader Service Card

October, 1957

modern machine shop



Letters and figures, deep-cut in hardened, special-formula steel, assure clean impressions and long service. Wide range of letter sizes. At your Mill Supply or write for circulars.

HOGGSON & PETTIS MFG. CO.

New Haven 7, Connecticut

For more data circle 489 on Reader Service Card

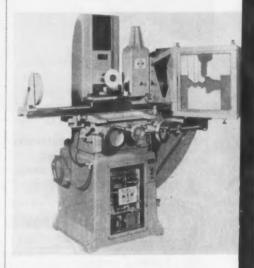
228 modern machine shop

new shop equipment . . .

consult a comparator. This is accomplished by projection of the workpiece on a ground glass viewing screen with magnification systems ranging from 10:1 to 100:1; the workpiece is ground and simultaneously inspected on the viewing screen enlargement. The downfeed control is graduated to tenths

The new continuous lubricating system is a low pressure rotary pump which provides a constant film on the machine ways. To give a smoother finish to the workpiece, the VG-3 has a nylon oil protected timer belt instead of the usual chain. A 110 volt electrical control, operating from 220 or 440 volts, has been installed to replace the previous direct 220 or 440 volt model. Other features of the machine include improved dust protection and 110 volt transformer to operate the working light.

For more data circle 107 on Reader Service Card



Cleveland VG-3 "Visual Grind" Form Grinder

EUSTOM-CUT SHAPES - Another reason why it pays to buy from U. S. STEEL SUPPLY!



v. s. Steel Supply's flame-cutting service reduces handling and machining costs

THE PICTURE ABOVE shows an ultramodern automatic flame-cutting machine preshaping to exact specifications an order of plate steel for a U. S. Steel Supply customer. And saving him plenty . . . by reducing his handling and machining costs . . . and by improving both the quantity and the quality of his output.

You'll find the latest custom-cutting equipment, including costly flame-cutting

machines, in all of our 18 warehouses. By using our facilities, you eliminate the need for installing and maintaining equipment of this type in your plant . . and thereby materially reduce your capital investment in shop equipment.

If you would like to know about the timeand-money-saving advantages of buying from U. S. Steel Supply, we suggest that you contact our nearest warehouse.

U. S. STEEL SUPPLY

DIVISION

P. O. Box 1099, Chicago 90, III.



General Offices:
208 S. LaSalle Street, Chicago 4, Ill.

Warehouses and Sales Offices Coast to Coast

UNITED STATES STEEL

For more data circle 490 on Reader Service Card

October, 1957

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modern machine shop

UNIT FOR MACHINING DIES

Designed by the Elox Corp., of Michigan, 1839 North Stephenson Hwy., Royal Oak 3, Mich., specifically for the die machining field, i.e. forge, die cast, blanking, extrusion, embossing, and so on, the M-501 18 by 43 DieMatic features the following advan-

tages: machining is completely automatic allowing one man to operate two or more units; dies are machined after heat treatment, therefore the die openings are not affected by normal heat treat distortions; forge dies can be reworked after washout without removing the entire cavity; and the Elox Process imparts a machined surface that normally improves die life.

The M-501 DieMatic is claimed to machine any metal, regardless of hard-

ness or density. It is also used to machine s of t steels and nonferrous metals, such as magnesium and aluminum, economically.

Machining is done by electrical energy, thereby eliminating any force on the tool which causes a tool to walk or cut untrue. This also eliminates burred or feathered edges.

The M-501 has longitudinal travel on the table. cross-slide travel on the overarm and vertical adjustment on the cross slide assembly for easy adjustment of electrode to workpiece. A high volume pump is supplied for fast filling of the work table pan. The coolant filter is mounted on the outside of the machine base to fa-



DREIS & KRUMP

Hand and Power Bending Brakes . Special Metal-Forming Machines

7418 South Loomis Boulevard, Chicago 36, Illinois

For more data circle 491 on Reader Service Card



LOOK ... NO HANDS!

That's right! The May-Fran CHIP-TOTE permits the continuous operation of machine tools by eliminating down-time for scrap removal . . . skilled workers stay on the job . . . production increases by as much as 20%! Versatile CHIP-TOTE conveyors are available in a wide range of sizes to serve practically any type or size of machine tool. Conveyor speed is adjusted to meet the scrap removal needs of the machine.

REMOVE CHIPS, TURNINGS AND BORINGS CONTINUOUSLY AND AUTOMATICALLY WITH A MAY-FRAN CHIP-TOTE

MAY-FRAN

ENGINEERING, INC.

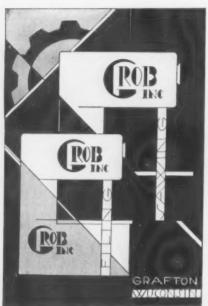
1708 Clarkstone Rd., Cleveland 12, Ohio For more data circle 492 on Reader Service Card



Write today for your copy of Bulletin MF-640

October, 1957

modern machine shop 231



For more data circle 493 on Reader Service Card



Flox M-501 DieMatic for die machining

cilitate easy change of filter elements. The power supply is a separate unit mounted on casters.

For more data circle 108 on Reader Service Card



PLUG GAGE HANDLE

Shown in the accompanying illustration is the VK Duplex handle offered by The Van Keuren Co., 175 Waltham St., Watertown, Mass. This modified A. G. D. handle makes possible the maximum control and flexibility of stocked gages as requirements change.

The members are locked in marked handle units for use as single end gages or combined for double end use. The need for duplication of sizes is reduced to minimum with resultant economy. The original marked data for each gage is in constant evidence



For more data circle 494 on Reader Service Card



12" Swing No. 2525-V Logan Screw Cutting Lathe

Brief Logan Lathe Specifications Swing, 14% down to 9'... Centers, 40' to 17'... Colletts, 1' to ½'... Spindle Bore, 1%' to 25/32'

Advanced Design Features
Ball Bearing Headstock . . . Variable Speed
Drive on larger models . . . Double V-Belt
Drive on smaller models . . . Automatic Safety
Gear . . . Precision Carriage . . 2-V-way,
2-flat-way precision ground bed, furnished
flame hardened at small additional cost.

■The Automatic Safety Gear neutralizes sudden overload shocks, automatically disengaging if the carriage or tool jams up, and thereby reduces breakage to all gears from the spindle through the quick change gear box and into the carriage. It is furnished as standard equipment with all Logan 12" and 14" lathes and may be ordered installed on new Logan 9", 10", and 11" lathes. The Automatic Safety Gear can be furnished for any quick change gear Logan Lathe already in your shop at a price of \$10.00 for 9", 10", or 11" lathes and \$15.00 for 12" or 14" lathes.

The safety gear typifies Logan advanced design and thorough construction. The Logan ball bearing spindle, variable speed drive, precision carriage and rugged, accurate bed are further reasons why you can depend on a Logan Lathe for exacting high speed production and second operations. Ask your Logan dealer for details, or write for the Logan catalog.

LOGAN ENGINEERING CO.

4901 WEST LAWRENCE AVENUE, CHICAGO 30, ILLINOIS

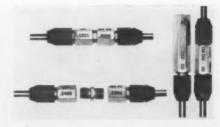
For more data circle 495 on Reader Service Card

232

new shop equipment . . .

for storage, or while being combined with other units.

On the completion of a job the ends may be unscrewed from their coupling; and each gage end, complete with its handle and marking, is stored in appropriate numerical order in



VK Gage Handles: (left) Duplex (right) AGD

a standard VK gage cabinet or on a gage stock board, ready for immediate reuse as required. There is no doubt as to gage identification, since each end is marked and colored green and red.

For more data circle 109 on Reader Service Card



CONTINUOUS HINGES

Manufactured by

AUTO MOULDING & MFG. CO.

WRITE FOR CATALOG

1114 E. 87TH ST.

CHICAGO 19

CLOSE QUARTER AIR DRILL

The Keller Tool "Angle-Matic" Drill, designed for producing accurate holes in small spaces even in the hardest metals, has been announced by Gardner-Denver Co., Quincy, Ill. This air drill operates in spaces as small as 4 by 4 inches, drills within ½ inch of corners, yet has positive power feed and develops up to 300 pounds of thrust. It uses ½-20 threaded aircraft drills. Other features include positive return, an angle head that can be mounted in any of four positions, and

For more data circle 496 on Reader Service Card

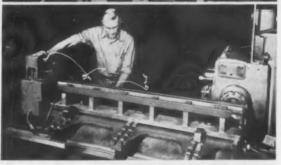


For more data circie 497 on Reader Service Card

MAJOR TIME SAVINGS

result from shift to magnetic clamping





Wrist lights tell the story in these two photos. The job is the same—only the clamping method changes. Note how the excessive motion required with mechanical clamping (top view) is eliminated with the change to Sundstrand magnetic clamping (lower view).

Longer tool life, greater clamping uniformity, and a significant reduction in operator fatigue are a few of the outstanding benefits you are sure to get with magnetic clamping. A quick check on its application to your jobs will show you others.



FREE DATA about Sundstrand magnetic clamping fixtures is available in Bulletin 584-M. Write for your copy today.



SUNDSTRAN

Magnetic - Pneumatic Products Division of Sundstrand Machine Tool Co. 1020-9th ST. . ROCKFORD, ILLINOIS

For more data circle 498 on Reader Service Card



Keller Tool "Angle-Matic" Air Drill

ready exchange of air motors of different speeds for different jobs.

The manufacturer points out that this drill meets a need, particularly active in the air-frame industry, for taking the tool to the work, rather than the work to the tool. The work is often a large unit or subassembly made of extremely hard metal. Here the power feed of the "Angle-Matic" drill is essential, not only for accurate holes but to make any hole at all.

For more data circle 110 on Reader Service Card

* * *

AIRCRAFT CONTROL SYSTEM BEARING LINE IS EXPANDED

Norma-Hoffman Bearings Corp., Stamford, Conn., has announced an expansion of its line of precision bearings designed for use in aircraft control systems.

The bearings, completely sealed and grease lubricated, have a full row of balls and special raceway curvatures to provide the maximum load carrying capacity. The inner rings extend at both sides so that, when clamped in a yoke, the outer rings will not foul the supports. The bearings are prepacked with an exactly measured amount of wide temperature range,

People work better when they SEE BETTER®



At Superior Tube Co.—Inspectors use Magni-Focuser to ensure flawless hypodermic needle tubing.

MAGNI-FOCUSER'S

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits ever regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

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With Third Dimensional (3-D) Vision
Leaves both hands free to work

Magni-Focuser—the binocular ragnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

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Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave.,

For more data circle 499 on Reader Service Card

THE LITTELL LINE

INCLUDES REELS FOR 100 LB. TO 40,000 LB. COILS

Your Littell Reel is easy to load. It holds the stock secure, unreels smoothly, accurately to automatic feeding equipment, press, shear or slitter. Like Littell Hooks, Straighteners, Roll Feeds, Coil Cradles and Sheeting Lines, your Littell Reel is proved by 39 years of dependable performance.



hydraulically expanded. Variable speed motor controls automatically adjust pay-off speeds.



FOR 100 TO 1000 LB. COILS LITTELL No. 3-G and 5-G

Smooth-running, ball bearing, Automatic Centering Reels uncoil stock or wind scrap.

FOR 2500 POUND COILS LITTELL No. 25-12 Double Plain Brake Reel Keeps one coil in reserve as it unreels stock. Swivelled to lock reserve coil in unreeling position.

FEEDING AND STRAIGHTENING MACHINE WITH COIL CRADLE Straightens and feeds stock .125"

thick x 72" wide at speeds up to 180 f.p.m. Hydraulic drive transmission, 25 h.p. motor.

ROLL FEEDS.REELS.STRAIGHTENING AND FEEDING MACHINES - COIL CRADLES . SHEETING LINES District Offices: Detroit, Cleveland

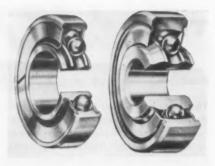
CATALOG 56 gives details on the complete Littell linewrite for your copy.

4163 Ravenswood Ave. Chicago 13, III.

For more data circle 500 on Reader Service Card

water resistant, filtered grease, meeting Government specifications.

The company's self-aligning KS Series, protected by permanently attached stainless steel side shields, allow a misalignment of 10 degrees in either direction. The KP and KP-A Series, which are not self-aligning, are protected by synthetic oil and grease resistant seals held in place by stainless steel split washers. Seals can



(Left) Norma-Hoffman Series KS Self-Aligning Bearing and (right) Norma-Hoffman Series KP and KP-A Non-Self-Aligning Bearing

The Leading Machine
Tool Manufacturers
use

RUTHMAN
GUSHER
COOLANT PUMPS

For more data circle 501 on Reader Service Card

THE RUTHMAN MACHINE CO. 1817 Reading Rd., Cincinnati 2, Ohio readily be removed for cleaning and regreasing. All of the company's aircraft control system bearings are cadmium plated on all exposed surfaces. For more data circle 111 on Reader Service Card

* * *

STAND FOR DRILLS AND TAPS

Zagar, Inc., 23898 Lakeland Blvd., Cleveland 23, Ohio, now has available



For more data circle 502 on Reader Service Card

Model

UL 7120

FREE-MACHINING STAINLESS STEELS can help you cut costs

Regardless of the kind of stainless steel you're working with—chromium-nickel, non-hardenable chromium, or hardenable chromium—there's an Armco free-machining grade to help you cut machining costs. Here is a list of these special Armco grades in each family:

CHROMIUM-NICKEL TYPES

Armco 18-8 FM (Type 303)

Armco 18-8 FM Se (Type 303 Se)

Armco 18-12 Mo FM (Type 316 F)

Armco 18-10 Cb-Ta FM Se . . (Type 347 F Se)

FERRITIC CHROMIUM TYPES

Armco 17 FM (Type 430 F)

MARTENSITIC CHROMIUM TYPES

Armco 12 FM (Type 416)

Armco 12 FM Se (Type 416 Se)

Armco 13-C-35 FM (Type 420 F)

Armco 17-C-100 FM (Type 440 F)

Armco 17-C-100 FM Se (Type 440 F Se)

All these grades are produced in a wide range of shapes and sizes in both bar and wire. All are available through your nearby distributor of Armco Stainless Steels. Check with him for your needs. Most Armco Distributors stock standard sizes and grades for immediate delivery.

If you don't know the name of the Armco Distributor negrest you, just write us at the address below. We'll gladly help you get in touch with him.

ARMCO STEEL CORPORATION

2107 Curtis Street, Middletown, Ohio . Sheffield Steel Division . Armco Drainage & Metal Products, Inc. . The Armco International Corporation For more data circle 503 on Reader Service Card





will do the iob so much quicker and better?

Send for Circular



DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.

For more data circle 504 on Reader Service Card



 Pioneers in the riveting field. Head rivets from smallest to 3/4" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Hori-zontal Multiple Spindles. Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO. 96 Sillimon Ave. Bridgeport 5, Conn.

For more data circle 505 on Reader Service Card 240 modern machine shop

new shop equipment . . .



Zagar Stand for holding drills and taps

as a production item a handy stand made for holding drills from 1/16 through 1/2 inch.

Next to each drill is a hole for the respective tap. A die casting with weight reduced and a felt bottom have been added. This stand measures 41/2 inches in diameter.

For more data circle 112 on Reader Service Card

IMPROVED POWER HACK SAW IS FASTER CUTTING

Faster cutting is made possible on Keller Power Hack Saws by an improved guide bar support arm and guide bar, according to an announcement by Sales Service Machine Tool Co., 2355 University Ave., St. Paul 14, Minn. The new guide bar support arm has been redesigned to give greater rigidity and this, together with a heavier guide bar, allows more pressure to be applied to the saw blade. Cutting time is reduced materially as a result, according to the company.

This improvement has been incorporated into five Keller Power Hack Saws. These include the Models No.



when you should be swaging?

There's no profit in chips, especially when you can save material, time, investment and labor costs by swaging. Rotary swaging has become the modern production method for reducing, pointing, tapering, sizing, assembling, bonding and forming ID contours with production tolerances to within \pm .001. Swaging improves physical characteristics, permits control of wall thickness, and eliminates finish grinding in many cases. Write today for the new Fenn Swaging Catalog. It may prove an eye-opener toward doing a better job on your product.

Visit Fenn Booth 1250 at National Metals Exposition



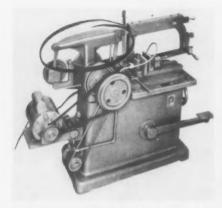
THE FENN MANUFACTURING COMPANY, 905 FENN ROAD, NEWINGTON, CONNECTICUT

For more data circle 506 on Reader Service Card

October, 1957

modern machine shop





Keller Improved Power Hack Saw

3B Dry Cut with 63/4 by 63/4 inch capacity, No. 3C Wet Cut with 63/4 by 63/4 inch capacity, No. 3CH Wet Cut with 63/4 by 63/4 inch capacity, No. 4 Hy-Duty with 81/2 by 81/2 inch capacity and No. 5 Hy-Duty with 101/2 by 9 inch capacity.

For more data circle 113 on Reader Service Card

BORING HEAD ROUGHS AND FINISHES IN ONE OPERATION

The specially constructed Deka-Bore Boring Head shown herewith, product of Precision Tool Manufacturing Co., Inc., 1305 S. Laramie, Cicero, Ill., not only does two jobs at once, but also has features that are said to reduce the cost of precision boring. Designed for a specific boring operation, the head is so rigidly constructed that the roughing tool in the front of the quill will remove stock from a cast hole, and the finishing tool will follow behind and finish the hole, holding a tolerance of 0.0003

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surface plates and precision accessories offer the user extreme accuracy -flatness in millionths!

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CLEEREMAN CONTRACTOR

"Series A" Automatic Drilling and Tapping Machines

producing faster...better...easier...from coast to coast!

Hartford, Conn. Pratt & Whitney Aircraft

Midland Park, N. J. Marlow Pumps Division

Reading, Pa. Textile Machine Works

Syracuse, N. Y. Carrier Corporation

Cortland, N. Y. Brewer-Titchener

Barberton, Ohio Ohio Brass Co. Cleveland, Ohio

Eaton Mfg. Co.
Cleveland, Ohio

Fawick Corporation Marion, Ohio

Eaton Mfg. Co. Highland Park, Mich.

Ford Motor Co.

Jackson, Mich. Calvin Machine Products, Inc. Saginaw, Mich.
Saginaw Steering Gear Division,
General Motors Corporation

Chicago, III.
Ford Motor Co., Aircraft Engine
Division

Libertyville, III. The Frank G. Hough Co.

Morton Grove, III. Bell and Gossett Co.

Springfield, III. Allis-Chalmers Mfg. Co.

West Allis, Wis. Allis-Chalmers Mfg. Co.

Tulsa, Okia. Aero Parts Mfg. Co., Inc.

Omaha, Neb. Omaha Production Co. Division, Vickers, Inc.

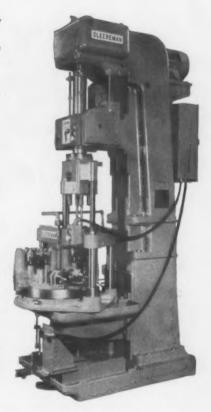
San Francisco, Calif. Chas. M. Bailey Co.

South San Francisco, Calif. Smith-Blair Co.

These are a few of the Cleereman "Series A" users who find this "box cycle" automatic Drilling and Tapping Machine the answer to their problems.

Drilling and tapping a hole "at the touch of a button" produces faster, easier and at highest profits. Operators are relieved of handling cumbersome controls. Operator morale is boosted and operator fatigue reduced.

Join the rapidly increasing Cleereman "Series A" users list. This fast set-up production-type drilling and tapping machine has a place in your plant. Don't delay increasing your production efficiency. Wire, write or phone about your jobs right now.



BRYANT Machinery & Engineering Company

General Office \$35 West Washington Blvd., Chicago & Excessional to Francisco Character CLEEREMAN MACHINE TOOL CORP.

GREEN BAY, WISCONSIN

For more data circle 508 on Reader Service Card

October, 1957

modern machine shop



inch. The Deka-Dial permits simple, rapid, accurate adjustments to 0.0001 inch on diameter, without backlash. The patented Deka-Bore movement is a radial adjustment, and not tangential, so that the proper clearance on the tool bit can be maintained at all times. The manufacturer states that



Deka-Bore specially constructed Boring Head

the Deka-Bore is especially well adapted to boring in close quarters, because this boring head can be made

especially well in close quarters, head can be made as short as 1½ inches in length, if the customer so desires.

For more data circle 114 on Reader Service Card



... alloy steel bars, billets and forgings in sizes, shapes and treatments for every need!

All seven of our warehouses are staffed and supplied to fill your alloy steel requirements promptly whether you need standard AISI, SAE or our own special HY-TEN steels—"the standard steels of tomorrow".

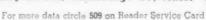
Write today for Wheelock, Lovejoy Data Sheets containing complete information on grades, applications, physical properties, tests, heat treating, etc.

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WHEELOCK, LOVEJOY & COMPANY, INC.

139 Sidney Street, Cambridge 39, Mass.

modern machine shop



ROTARY CUT-OFF MACHINE

It is claimed that as many as 2,000 pieces of pipes and tubes. ranging in size from 3/8 to 11/4 inch o.d. in light to 16 gauge wall thickness, can be cut per hour on an air operated rotary cut-off machine, manufactured by Continental Machine Co., 1952 North Maud Ave., Chicago 14, Ill. The operator simply feeds the pipe or tube to a preset stop, touches the air valve foot switch and the rotary blade descends at the desired cutting

October, 1957

H LES JIG GROUND with

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.





Borrow our instructive 11 minute movie on Jig Grinding.

A five station indexing fixture from Vulcan's Contract Tool Room (Your tool room in Dayton). Using a jig borer index table with the Vulcanaire 5 indexing holes and 35 locating and clamping holes were JIG GROUND in place. Result—eliminated all close locating and dowelling of individual parts and of course hours of time.

*Vulcanaire equipment pays for itself on the first job.

Services

ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO. {YOUR TOOL ROOM IN DAYTON}



For more data circle 510 on Reader Service Card

October, 1957

modern machine shop

speed, cutting the material and leaving a clean, smooth edge.

Rotary cutting is said to provide faster cutting since its action is through the wall thickness rather than the entire diameter of the material.

Spin your RIVETS



faster and more economically on the NOISELESS LINLEY RIVETER

Rivet spinning on the Linley is a sure way to cut production costs. With Linley equipment, you can easily produce finely finished rivets even in close piaces. Send us samples of the work you want riveted, and without obligation we'll show you how it can be done the Linley-way and what it will cost.

Machines available for handfing iron and cold rolled steel rivets up to 3/4" and larger size rivets in softer materials.

Send for Bulletin R today.

LINLEY BROTHERS CO.

Also builders of JIG BORERS 671 State St., Ext., Bridgeport 1, Conn.

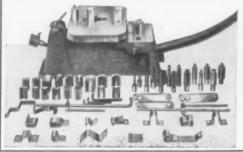


Continental Air Operated Cut-Off Machine

This, plus the automaticity of the air operation, is said to eliminate operator fatique, permitting steady, high production rates. For intermittent use, a handle can be attached for manual operation.

Adjustable pipe and tube support tables are available with nylon fork rollers to minimize scoring of material that is to be cut off in the machine.

For more data circle 511 on Reader Service Card For more data circle 115 on Reader Service Card



Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

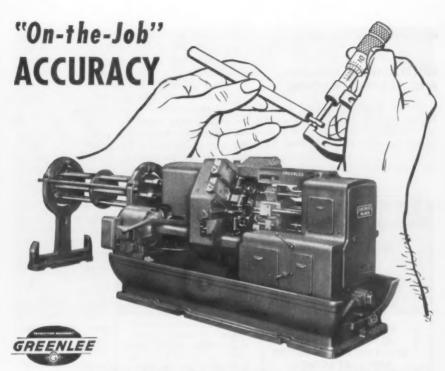
AIR OR HAND MODELS FOR UP TO

1/4" to 4" MATERIAL
Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO. Dept. 6-M Kalamazoo, Mich.

For more data circle 512 on Reader Service Card

246 modern machine shop



AUTOMATIC BAR MACHINES

Greater Dependability . . . Faster Production



Write today for Catalog A-405, first step on the way to more profitable production with Greenlee Automatic Bar Machines. Modern production demands greater accuracy... at greater speeds. Greenlee Automatic Bar Machines maintain rigid production schedules and hold each piece within required tolerances. Let Greenlee engineers show you how Greenlee Automatics save time and money. It will pay you to investigate.



GREENLEE BROS. & CO. 1890 Mason Avenue Rockford, Illinois

For more data circle 513 on Reader Service Card

October, 1957

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MULTI-SPINDLE DRILLING AND TAPPING MACHINE

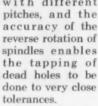
Aaron Machinery Co., Inc., Dept. M. 45 Crosby St., New York 12, N. Y., recently introduced the Starrett Multi-Spindle Drilling and Tapping Machine. This highly developed quality tool is arranged for rapid adjust-

ment of the spindles and is suitable for short runs of work, as well as long. continuous operations. The gears and universal joints operate in a continuous oil bath. The spindles can be fixed in any position either in circles, straight lines or irregularly. The spindles can operate at different speed ranges. Automatic depth gages are provided and a foolproof device, electrically controlled, governs the operation. Tapping operations may be done

> with different pitches, and the accuracy of the reverse rotation of spindles enables the tapping of dead holes to be done to very close tolerances.

Further-

more, this machine features all gear transmission from shaft to spindle; case hardened, tem-





Starrett Drilling and Tapping Machine

LUBRICATION ECONOMY

"We Recommend This Lubricant To Our Customers"

says PACKAGE MACHINERY COMPANY

ALSO MAKES CARS AND TRUCKS RUN BETTER AND LAST LONGER



"We have found LUBRI-PLATE Lubricants very effective. To assure proper re-lubrication of our machines with LUBRIPLATE Lubricants, we tag them with lubrication instructions before shipment. Thus purchasers know the LUBRI-PLATE product we recommend and where to obtain

- 1. LUBRIPLATE reduces friction and wear.
- 2. LUBRIPLATE prevents rust and corrosion.
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LUBRIPLATE DIVISION Fiske Brothers Refining Co. Newark 5, N.J.-Toledo 5, Ohio

DEALERS EVERYWHERE, consult your Classified Telephone Book ...

For more data circle 514 on Reader Service Card

248 modern machine shop October, 1957



57.15

Ever see a broach this large before?



This mammoth broach accurately broaches involute splines in steel for a builder of earth-moving equipment. Built by Ex-Cell-O's Continental Tool Works Division, it called for a series of critical manufacturing operations, including a difficult hardening process applied to the shell main body . . . another good example why it pays to call in your local Ex-Cell-O Representative when you face an unusual broaching problem.

Just one of the many other types of broaches built by Continental.

Ontinental TOOL WORKS

Division of Ex-Cell-O Corporation DETROIT 32, MICHIGAN

For more data circle 515 on Reader Service Card





With a SUNDSTRAND Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

Accurate Spacing, Powerful Clamping Insures Accuracy



Sundstrand Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today.

STREETAND Ask for bulletin



SUNDSTRAND MACHINE TOOL CO. 2539 Eleventh Street, Rockford, Ill., U.S.A.

For more data circle 516 on Reader Service Card
250 modern machine shop

new shop equipment . . .

pered ground greas; automatic feed with four normal, four rapid speeds; instant fixing, predetermined depth control and ball and roller bearings throughout.

For more data circle 116 on Reader Service Card

* * *

POWER OUTLET STRIPS ADDED TO BENCH LINE

Wiremold electric outlet sections, which can be quickly installed on any of its line of Hallowell shop benches, are now being offered by Standard Pressed Steel Co., Jenkintown 22, Pa. Sections are prewired and complete. No makeshift wiring is needed to put power on tap safely at bench top level. It is only necessary to bring in lead-in wiring of armored cable or conduit for the bench to be electrified.

Sections are Underwriters' approved for 15 ampere, 125 volt service. Wiremold sections provide individually grounded, two wire NEMA receptacles with three prong, double wipe contacts every six inches. The strips can be mounted to lie flat along either vertical or horizontal surfaces on the front or back of the resin wood, pressed wood, laminated wood or metal



S.P.S. Wiremold Electric Outlet Section

October, 1957

new shop equipment . . .

wiring, but can be trimmed by the user to exact bench length, if desired.



90 to 3750 r.p.m. The right speed for the job! Controlled by convenient lever on front of cabinet. Precision dial shows selected speed. No belts to change — no tools to bother with!

Put this 11/8" collet capacity, 9"

swing lathe in your shop for the fine, fast and variable work uneconomical on larger machines. Learn how you'll out-produce and under-cost by writing for Bulletin 918SL.

RIVETT
LATHE & GRINDER, INC.
Dept. MMR10



For more data circle 517 on Reader Service Card

October, 1957

par I.

modern machine shop

bench tops. Any Hallowell bench, whether of cabinet, unit or open construction, can be equipped with the Wiremold sections.

Standard lengths for sections are 49%, 61% and 73% inches. These are 1% inches longer than corresponding bench lengths to accommodate lead-in

wiring, but can be trimmed by the user to exact bench length, if desired. Sections are 1-9/32 inches in width. Depth (outlet included) is 7/8 inch. For more data circle 117 on Reader Service Card



MICROMETER HEIGHT GAGE

Foster Supplies Co., 6122 Milwaukee Ave., Chicago 30, Ill., has an-

nounced a newly designed "Microball" Height Gage. Absolute positive action is controlled by indexing at 0.500 inch intervals by means of hardened steel balls set in a stainless steel column. Intermediate settings are made by an operating micrometer gage, in-



WOODWORTH CHUCKING EQUIPMENT

Our tough looking character who is holding the little bird clearly demonstrates one fact: whenever you are holding anything it should be secured with gentle firmness. And this is so true when considering chucking equipment.

Your best machine will produce only as accurately as its work-holding device permits and Woodworth manufactures the most rugged, accurate and dependable chucks for precision machining in America.

We invite your inspection and consideration of N. A. Woodworth products. There is a Woodworth Sales Representative in your area and a letter to the N. A. Woodworth Company will place him promptly at your service.



For more data circle 518 on Reader Service Card



Foster Microball Height Gage

October, 1957

252 modern machine shop



Here they are . . .
"Operator-Engineered"
Features that mean
high finishes –
effortlessly

NEW HYDRABRASIVE

Precision Surface Grinders

No trouble with this rugged column shifting or moving out of line.

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1-

Easy to keep clean — modern lines with smooth surfaces.

Column ways are kept free of dirt with these guards.

Head will never wobble like an extension ladder — these bearing surfaces never diminish.

Column ways are lubricated for you as head travels up and down.

Forget spindle lubrication. It's lifetime sealed. Motorized, of course.

No back-breaking crouching to line up work with elevating wheel located here.

No busted knuckles adjusting these table travel dogs.

Never any drag on these ways. Coolant and grit is kept out by patented shields totally enclosing ways.

No danger of flying fragments, no pesky vibration with this heavy cast iron wheel guard.

No wasted time removing metal with this big 12" wheel.

Telescoping waterguards easily adjust.

Power feed and handfeed—standard

equipment — can be interchanged without waiting for oil to drain out of cylinders. Safe, too!

You will like the solid feel of these smooth, recessed hand controls. And, the graduations are direct, big and easy to read.

Heat expansion won't spoil your work with this air cooling, coupled with simple, low pressure hydraulic system. You can roll the entire unit right out this door, too.

You won't stub your toes trying to get close to these grinders.



ABRASIVE

MACHINE TOOL COMPANY EAST PROVIDENCE, RHODE ISLAND

FREE! All Hydrabrasive "operator-engineered" features are fully illustrated and described in this big 6 page catalog. Write for your copy now.





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Orlober, 1957

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How To Get Things Done Better And Faster



BOARDMASTER VISUAL CONTROL

- Gives Graphic Picture Saves Time, Saves Money, Prevents Errors
- Simple to operate Type or Write on Cards, Snap in Grooves
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- Attractive. Over 200,000 in Use.

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GRAPHIC SYSTEMS

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new shop equipment . . .

corporated in the design, reading direct to within a tolerance of 0.0005 inch. This gage is easy to read without the aid of any magnifying devices and completely eliminates the vernier scale. All corrosion and glare is eliminated by a heavy satin chrome finish. For more data circle 118 on Reader Service Card

* * *

SPACER TABLE AFFORDS AUTOMATIC POSITIONING

Industrial East Co., P. O. Box 561, Clifton 2, N. J., has announced the availability of its Automatic Positioning Spacer Table. The spacer table now brings the advantages of automatic positioning to any shop equipped with a drilling or boring spindle. It embodies simple, manual operation which may be learned by any drill press operator in a few minutes, and is low in cost.

The accuracy of the spacer table depends solely upon the accuracy of the spindle under which it is used. Drilling and tapping may be performed without need of jigs. Drilling, reaming and boring are done to close tolerances without boring fixtures.

Construction of this table makes possible the performance of heavy duty drilling. There is no overhang and the

CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams— Design Assistance Offered

KIDDE PRECISION TOOL CORP.

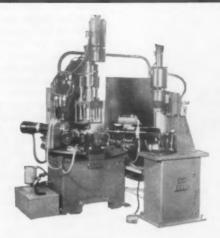
15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 521 on Reader Service Card

October, 1957

new shop equipment . . .

nisms are simplified so that an average mechanic can master them fully



NEW SINGLE-OPERATOR DUAL MACHINE

How Govro-Nelson Automatic Drilling and Tapping Units can be used to speed up production can be seen in this two-position machine which incorporates 2 vertical and 5 horizontal units for drilling and tapping 12 holes in three similar parts.

Two holes are drilled in one position and ten holes are tapped in the second position.

The operator alternately loads the two machines, completing the drilling operations on a manually clamped fixture (right), and tapping ten holes simultaneously on the second machine (left) which automatically clamps, taps and releases the part. Output: 300 parts per hour.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

GOVRO-NELSON CO.

Machinists of Precision Parts for 34 Years
1933 Antoinette
Detroit 8, Mich.

Automatic DRILLING UNIT

For more data circle 522 on Reader Service Card

October, 1957

modern machine shop



Industrial East Automatic Positioning Spacer Table for heavy duty drilling

wide bearing areas make the spacer table the equivalent of an almost solid mass of high grade cast iron and heat treated steel. The operating mechanisms are simplified so that an average mechanic can master them fully in 15 or 20 minutes. There are no electronic or hydraulic components. The entire system operates on simple electrical principles.

Locations may be established by any of a wide variety of methods. First piece or toolroom work may be done by using gage blocks or end measures and micrometers. Practically any measuring units may be used. The spacer table will also accommodate "Duplitrol" Bars which may be purchased to individual specifications or to 1 inch spacings.

The manufacturer states that the positioning units will duplicate to less than 0.001 inch, any measurement standard used. The conveniently located indicators (bottom right of illustration) and the measuring troughs are both shown in the accompanying illustration.

For more data circle 119 on Reader Service Card



ECONOMY TOOL & MACHINE CO. 1827 South 68th Street

Data Sheet No. 7-A upon request. Ask for prices on salvaging worn-out plug and ring gages.

For more data circle 523 on Reader Service Card

modern machine shop

October, 1957

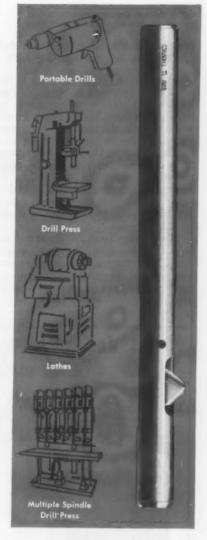
use your head*

COGSDILL BURRAWAY tools

*Any work head will accommodate this highly versatile deburring and chamfering tool!

Whatever your hole deburring problem . . . the clean, quick action of the Cogsdill BurrAway Tool, with its spring-loaded double-edged cutter blade, completely deburrs both faces around any hole or series of holes in line in one rapid in-and-out operation.

We will be pleased to have our local representative show you how this versatile tool can be used successfully with your particular equipment.





Cogsdill

12980 W. Eight Mile Road, Oak Park 37, Michigan

For more data circle 524 on Reader Service Card

October, 1957

modern machine shop

257

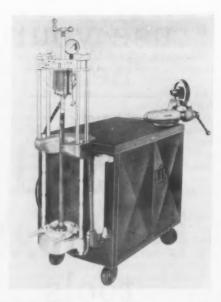
plus bending and straightening operations. Top press plate throat is 8 inches deep with $10\frac{1}{2}$ inch clearance

A foot operated heavy duty floor lock assures positive control of the maintenance bench.

PORTABLE MAINTENANCE BENCH TAKES THE TOOLS TO THE JOB

Wright Tool Co., 4316 North Woodward Ave., Royal Oak, Mich., has announced a mobile unit, called the Wright Portable Maintenance Bench, which affords the convenience of moving tools directly to the job location, instead of taking the work to the tools. This easy rolling unit can be easily moved by one man because of the heavy duty roller bearing casters. Once moved, this sturdy unit can be securely locked to the floor by means of a foot brake.

The Power-Twin Hydraulic Press is a 17½ ton open throat adjustable press. The Center-Hole Ram permits push or pull operations in the removal and replacement of bearings, gears, pins, bushings, shafts and pulleys,



Wright Portable Maintenance Bench



For more data circle 525 on Reader Service Card

plus bending and straightening operations. Top press plate throat is 8 inches deep with 10½ inch clearance between uprights, Maximum clearance between the ram and the bottom press plate is 33 inches. This Power-Twin Ram may be detached and used as a portable power unit for vertical lifting or as a pusher in moving machinery.

This bench unit features an all welded steel construction. The 3/16 inch steel top absorbs heavy pounding and will support up to 2,500 pounds.

The 24 by 36 inch top provides a large work area and allows easy access in aisles and passageways.

The interior compartment area is 28 inches high, 17 inches wide and is 23 inches deep. This accommodates large tools, chain falls, gear pullers, pipe cutters, electric drills and various other items. The right side has a large tool drawer and three shelves.

A foot operated heavy duty floor lock assures positive control of the maintenance bench.

A 50 foot retractable extension cord can be pulled out from a spring takeup reel to supply power to the four outlet plugs which will accommodate electric drills, bench grinders, impact tools, trouble light and so on.

For more data circle 120 on Reader Service Card

* * *

STAGGERED TOOTH WOODRUFF CUTTERS

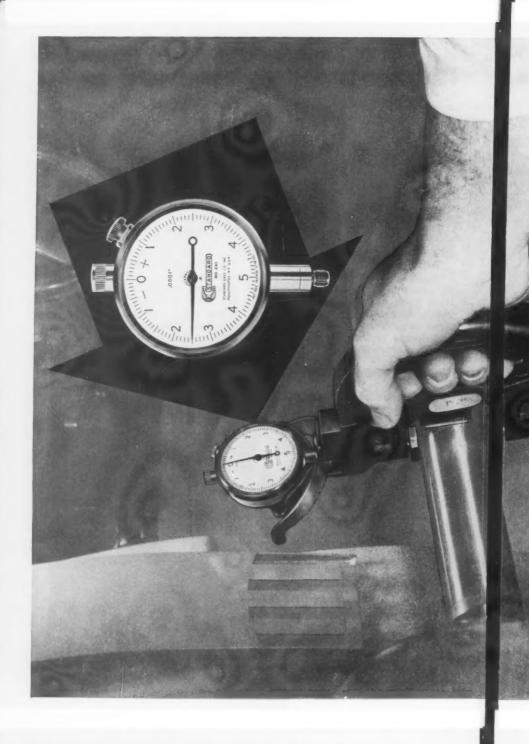
Supreme Keyseat Cutters Co., 1328 Forty-Third St., Kenosha, Wis., has announced the addition of staggered tooth keyseat cutters to its line of Standard Woodruff Keyseat Cutters. These cutters are stocked in all standard sizes. The cutters are recommended for hogging cuts in production key-



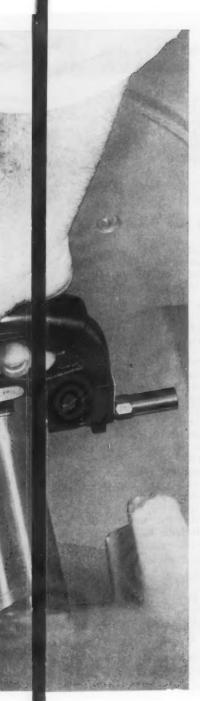
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October, 1957

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Back of Every STANDARD Dial Snap is the Famous STANDARD Dial Indicator

A dial snap gage is only as good as its dial indicator. That is just one reason why STANDARD Dial Snap Gages are so widely preferred. STANDARD brings you the most complete line of Dial Snaps available. Models for every job... many with

exclusive PARALLOC® features to assure continuing parallelism even after repeated adjustments. High accuracy distinguishes them, as well as first-cost and cost-in-use considerations.

Ask the Man from Standard or Write Direct for Special Dial Snap Bulletin



STANDARD GAGE COMPANY, INC.

POUGHKEEPSIE, N.Y.

A COMPLETE LINE OF GAGES . . . INDICATING, FIXED AND ADJUSTABLE TYPES

For more data circle 528 on Reader Service Card

Now! A Complete Line of Self-

SPECIFY TOP QUALITY



ARBOR SPACERS

SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ½" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK .

Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK .

Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages—12 thicknesses, .001" to .015", and 15 thicknesses, .001 to .032".

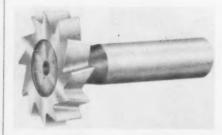


DETROIT STAMPING CO.

349 MIDLAND AVE., DETROIT 3, MICHIGAN For more data circle 529 on Reader Service Card

modern machine shop

new shop equipment . . .



Supreme Staggered Tooth Woodruff Cutter

seating and hard to cut materials. Special sizes can also be furnished with the staggered tooth design.

For more data circle 121 on Reader Service Card

* * *

EXTRA POWERFUL PORTABLE GRINDER

The Vee-Arc Corp., Westboro, Mass., has announced a portable grinder which they claim has many advantages in design and performance. This 14 pound tool is stated to be rugged and compact, is perfectly balanced for easy handling, and is made for use with 9 inch disc wheels, as well as with 7 inch cup wheels.

One of the many features is the use of a 2 h.p., 115 volt a.c./d.c. motor—only 60 per cent of its power is required for normal operation, leaving an ample reserve for the tough jobs. Other features include ball bearings



Vee-Arc Portable Grinder weighs 14 pounds

October, 1957

new shop equipment . . .

262

the use of the tool is governed only

Now! A Complete Line of Self-Locking Microsize UNBRAKO Socket Cap and Set Screws

Nos. 0, 1, 2 and 3 in alloy steel and stainless steel are available with the Nylok* feature

You effect major economies in time and money when you design and assemble small devices with self-locking microsize UNBRAKO socket screws. These close tolerance screws won't work loose. They simplify standardization of small devices where maximum reduction of weight is required without sacrifice of strength. They eliminate the necessity of designing costly special screws to fasten tiny parts in compact assemblies and they prevent the waste of production time while waiting for delivery of special screws.

In addition to having the overall advantages of microsize Unbrako socket screws, these screws can be used in holes tapped in soft or die cast materials without stripping threads and ruining expensive work. Also the set screws can be used with hardened shafts, since they lock against the threads of the tapped hole.

All Unbrako socket screws can be supplied with the self-locking Nylok feature. The Unbrako with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Seated or not the screw locks positively wherever wrenching stops. The screw won't work loose because the tough resilient nylon pellet forces mating threads together.

Self-locking microsize Unbrako socket cap and set screws are available in sizes #0 through #3, in heat treated alloy steel (plated or unplated) and stainless steel, at your authorized industrial distributor. To serve you well, he also carries a complete stock of other self-locking Unbrako socket screws. Or write us for literature and samples. Unbrako Socket Screw Division, Standard Pressed Steel Co., Jenkintown 22, Pa.

°T.M. Reg. U.S. Pat. Off., The Nylok Corporation

We also manufacture precision titanium fasteners. Write for free booklet.



Jenkintown * Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co., Inc. • Cooper Precision Products • Standa Canada Itd. Unbrako Socket Screw Co., Itd.

For more data circle 530 on Reader Service Card

October, 1957

modern machine shop

throughout; vital parts lubricated and dust sealed, all parts rust and corrosion resistant; no load speed 5,300 r.p.m.; spindle 5/6-11 RH. This portable grinding unit is equipped with "Klixon" automatic reset overload protector. It is equipped with a 10 foot heavy duty Neoprene power cable and

the use of the tool is governed only by the nearest electrical outlet, making it extremely versatile.

For more data circle 122 on Reader Service Card

* * *

LEAD HAMMER MOLD

Podlin Tool Co., 11917 Franklin Ave., Franklin Park, Ill., is presently marketing a lead hammer mold and handle, along with a lead alloy

> for making lead hammers. The molds are made of two semi-steel halves, hinged together. No clamps are needed. Therefore, there are no parts to lose. The lead cannot run into the handle, giving the hammer good balance. The hammers are easy to remove from the molds, thus the molds do not become beat up.



MGILL Levolier INDUSTRIAL SOCKETS

. . multiply maintenance savings

McGill Industrial sockets, built stronger to last longer, save maintenance and production downtime. The minutes saved by avoiding frequent socket replacement on each light are multiplied into hours and dollars when you replace ordinary sockets with McGill Industrial sockets all over your plant.

WRITE FOR McGILL CATALOG No. 84
Available from Electrical Wholesalers

McGILL MANUFACTURING CO., INC.

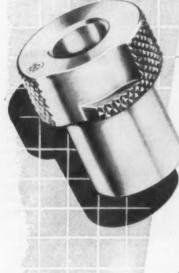
850 N. Campbell St. Valparaiso, Indiana
For more data circle 531 on Reader Service Card

Podlin Lead Hammer Mold and Handle



October, 1957

ABC DRILL JIG BUSHINGS



Last Longer

Because of . . .

- 1. High-carbon chrome bearing steel for consistent quality.
- 2. Controlled-atmosphere heat treatment for uniform hardness and maximum wear resistance.
- 3. Precision ground and honed for dimensional accuracy concentricity.
- 4. 100% inspection for assured customer satisfaction and confidence.

Call or write today for your Accurate Drill Jig Bushing Catalog and price list.

ACCURATE

BUSHING COMPAN





442 NORTH AVENUE GARWOOD, NEW JERSEY

ASA STANDARD DRILL BUSHINGS . PRECISION PARTS . PIERCING PUNCHES

For more data circle 532 on Reader Service Card

October, 1957

modern machine shop

The handles are made of tubular steel, formed oval in shape for comfortable grip and to prevent slipping and twisting in the hand.

The lead is alloyed to give the maximum amount of beats and best results from the hammers.

For more data circle 123 on Reader Service Card

ELECTRONIC GAGE

A new type of electronic gage, called the Versachek, has been announced by the Instrument Gage Division, The Taft-Peirce Manufacturing Co., Woonsocket, R. I. The Versachek converts minute differences in established dimensions into voltage changes and amplifies them for reading on a meter scale by means of electronic circuitry. A basic Versachek unit consists of

electronic amplifier and pickup head, mounted on either a height gage stand or comparator stand. Gaging is accomplished by setting the Versachek gage head to a specific dimension by means of gage blocks or other suitable master and comparing actual product dimensions, reading the variance from the master on the meter scale.

The Versachek is named for the extreme flexibility in selection of ranges. There are four magnifications available on the standard unit: 400:1, 2,000:1, 4,000:1 and 20,-000:1. These can be quickly selected by a switch on the front panel. Other magnifications can be furnished for special applications. The Versachek



SAVES 80% on machine installation costs (Am.Type Founders) 20% on production-labor costs (Colo. Fuel & Iron Corp.)

Here are three reasons Barry Mounts will give YOU these savings:

You don't have to drill floors, set anchors, and lag down machines.

Just put a Barry Leveling Mount on each machine foot and
set the machine right where you want it. The built-in vibration control won't let the machine "walk".

You can easily move any machine — anywhere.

All you do is pick it up and set it down in its new location. It's back in production in minutes.

You don't have to fuss with shims to get the machine level.

Just turn Barry-mount leveling screws and tighten locknuts.

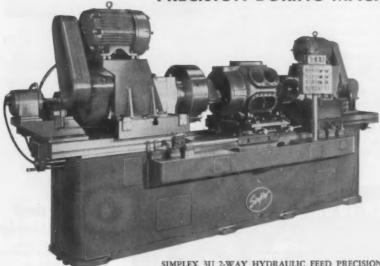
Ask for: Reprint of "The Iron Age" report on proved savings; Plant-survey Chart showing cure for 8 production losses.

BARRY CONTROLS incorporated, 785 Pleasant St., Watertown, Mass.

For more data circle 533 on Reader Service Card

Simplex

PRECISION BORING MACHINES



SIMPLEX 3U 2-WAY HYDRAULIC FEED PRECISION BORING MACHINE equipped with one SIMPLEX #4 precision boring head (right side) and one SIMPLEX #5 precision boring head mounted on the left side. Each of the two sliding units supports, in addition to the boring heads, a drive unit, drive motor, and feed-out mechanism, one providing 3" of feed-out stroke and the other 1½". Two work holding fixtures, each designed to hold three sizes of Compressor Housings, were also furnished.

25TH YEAR

SIMPLEX MACHINE TOOL CORPORATION

4540 WEST MITCHELL STREET MILWAUKEE, WISCONSIN

PRECISION BORING MACHINES . PLANER TYPE MILLING MACHINES SPECIAL DRILLING, TAPPING AND BORING MACHINES

For more data circle 534 on Reader Service Card

October, 1957

Simplex

uses self-calibrating circuit which eliminates the need for constant reference to gage blocks.

The manufacturer states that there is unusually fast response, and connecting cables can be any length; the complete unit can be set up quickly by a single reference to gage blocks or other master—zero is always the same; operation is said to be foolproof, as accuracy is not affected by voltage fluctuations, and special pilot lights on the meter indicate the scale in use.

The Versachek Electronic Gage is completely portable and can be universally adapted to various other devices such as ink recorders, oscilloscopes and digital volt-meters.

The Versachek is housed in a mod-



Taft-Peirce Versachek Electronic Gage

ern aluminum cabinet with handy controls and ready accessibility to the chassis.

Overall dimensions are 9½ inches wide by 7¾ inches deep by 8½ inches high and weight is only 13 pounds, plus required stand.

For more data circle 124 on Reader Service Card



HOW TO CHUCK IRREGULAR PIECES

CERRO DE PASCO SALES CORPORATION 304 PARK AVENUE, NEW YORK 22, N. Y.

For more data circle 535 on Reader Service Card

quickly and inexpensively

t's easy to make chuck jaws for irregular work-pieces with Cerromatrixo. the low-temperature melting alloy. Just cast it against the workpiece and you get an accurately fitting pair of jaws. The alloy can be cast against forged metal parts, die castings, rubber, wood and most plastics without burning or warping the piece.

Send for Bulletin B5 it tells the whole story.

ANOTHER LODDING



Now ready for you at your nearest Lodding distributor

LODDING, INC. WORCESTER 1, MASS.

Precision Tool Sales 417 E. Florence Ave. Los Angeles 3, Calif.

FACTORY WAREHOUSES

Bagby Engineering Co. 1047 Forest Ave. Evanston, III.

For more data circle 536 on Reader Service Card

SADDLE TYPE TURRET LATHE

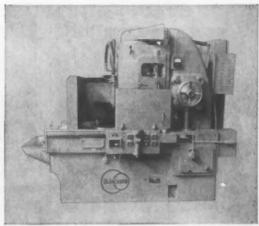
An addition to its line of extra heavy duty saddle type turret lathes, the 36 inch swing 5-A machine, has been announced by The Warner and Swasey Co., Cleveland, Ohio, Designed to provide the balanced power, accuracy and maneuverability necessary for precision, high production metal turning on large size workpieces, the 5-A lathe features a 75 h.p. two speed main drive motor coupled to the spindle through an automatic, hydraulic shift preselector headstock. With this drive motor and headstock combination, the machine offers 28 turning speeds, from 10 to 280 r.p.m. According to the manufacturer, the 5-A is adaptable to a majority of existing

tooling and, in addition, can be equipped with the latest types of special turret lathe attachments.

Operation of the automatic hydraulic shift preselector headstock is said to be virtually effortless eliminating the fatiguing strain usually associated with speed changing on a machine of the 5-A's capacity. A single lever controls engagement of the forward and reverse clutches. neutral and brake positions, and initiation of the gear shift and speed change - all accomplished merely by pushing the lever "in" toward the headstock. The shift is completed automatically in a matter of seconds without further attention by the operator, leaving him free to



For best results
from your
Blanchard
Surface Grinder



BLISCHEE SO IN SERVICE COMMI

Use Blanchard Wheels!



Blanchard specializes in the manufacture of segments and cylinder wheels for Blanchard and other Vertical Spindle Surface Grinders. If you have a difficult grinding job, whatever the material may be, or if you are not satisfied with the results you are now getting, let us help you.

Blanchard wheels are the quality wheels for Blanchard Grinding. Use them to get maximum performance from your Blanchard!

PUT IT ON THE



Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd Edition).

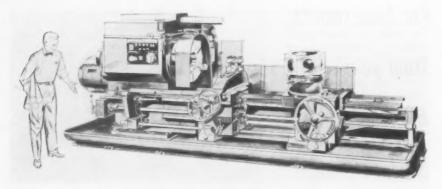
THE BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASSACKUSETTS

For more data circle 538 on Reader Service Card

October, 1957

modern machine shop



Warner and Swasey 5-A Saddle Type Turret Lathe features a swing of 36 inches

concentrate on the tool positioning.

The functionally designed, compact cross slide and saddle aprons of the 5-A are equipped with power rapid

traverse to reduce operator effort and minimize handling time. The power rapid traverse feature on the cross slide offers both longitudinal and

ENTAL Certified D

Today's drilling problems on both standard and new metals require twist drills with something extra built into them. That's why Continental drills are so acceptable to leading cost conscious production plants. Ask your industrial jobber

WAREHOUSES:

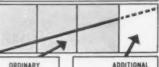
NEW YORK

LOS ANGELES 50 Church Street 6551 Whittier Blvd.

TACOMA, WASH, 2006 Center Street

ORE HOLES

MAJOR PRODUCTION PLANTS PROVE CONTINENTAL DRILLS LAST LONGER!



DRDINARY PRODUCTION WITH DRILL CONTINENTAL DRILLS

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CORPORATION

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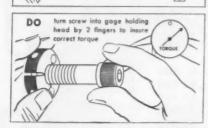
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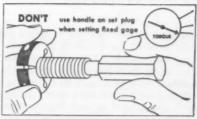
When measuring high limits

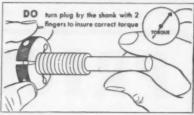
DON'T Furn fixed gage onto strew

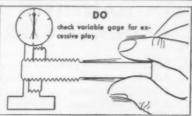




When gaging gages







These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

3A threads: what they are; how to gage them—new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard Unbrako socket screw products fall within specified tolerance limits no

matter what method is used to gage them. Leading industrial distributors carry complete stocks. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.



Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for your free copy today.

STANUAND PRESSED STEEL CO.

UNBRAKO SOCKET SCREW DIVISION

DE SPS
JEHKINTOWN PENNSYLVAN

For more data circle 540 on Reader Service Card

without lifting from its seat, thus sealing out foreign particles which could

transverse movements. A choice of 16 easily selected power feeds is provided in each apron. They are reversible in the cross slide apron and applicable to either cross or longitudinal feeding.

Machined from a solid steel forging, the 5-A's rugged square turret is of the open or hollow center type, allowing grouping of cutters. It indexes result in loss of accuracy.

The hexagon turret, designed for fast and easy operation, revolves on a preloaded precision tapered roller bearing which causes the turret to raise slightly during indexing, eliminating wear on the seating surfaces and minimizing the effort required to index a heavily tooled turret. A powerful circumference binder ring

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES

1-TON,	Bench Type\$	605
2-TON,	Bench Type\$	680
5-TON,	with Base\$1,	530
	with Base\$1,6	
10-TON,	Floor Type	290
25-TON,	Floor Type	790

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.



HANNIFIN

HANNIFIN CORPORATION, 565 S. WOLF ROAD, DES PLAINES, ILLINOIS

For more data circle 541 on Reader Service Card

Graymills Corp. cuts costs dramatically with an

Engelberg Abrasive Belt Grinder

The shape of the intake-discharge housing on a Graymills immersion pump makes surface milling or turning on a lathe unsuitable . . . requiring costly corrective machining.

To an Engelberg platen type abrasive belt grinder, equipped with an automatic infeed table (the BG8-FT9 described below) Graymills attached a draw-bar air fixture of their own design. This handles several sizes of castings with short run flexibility and minimum setup time.

Grinding rates on the grey metal pump castings are now considerably faster than alternative methods, in spite of a ½2" stock removal. Satisfactory belt life is obtained with 24-grit silicon carbide running at 5,000 s.f/m., cooled by a water-soluble chemical.

Proving that the adaptability of Engelberg abrasive belt grinders is limited only by the ingenuity of the engineers who program its use.



● Fast machining by wet or dry abrasive belt, backed by ground steel platen. Presetting controls rate of feed and pressure. Quick approach of ball-bearing table is followed by slower, hydraulically controlled infeed down to MicroStop limit.

For complete information on this and other Engelberg Abrasive Belt Grinders, write...



The ENGELBERG HULLER
Co., Inc.
1010 Seneca St., Syracuse, N. Y.

Precision ABRASIVE BELT GRINDERS

For more data circle 542 on Reader Service Card

274

automatically clamps the turret in position and also serves as an effective seal against dirt and chips.

This clamping action of the ring is claimed to relieve the turret lock bolt of all strain occurring during the actual cutting operation.

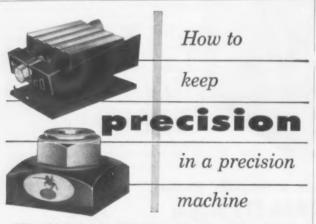
For more data circle 125 on Reader Service Card

MILLING MACHINE HAS AUTOMATIC INDEXING ATTACHMENT

The Reishauer Type FA Milling Machine, especially suited for milling workpieces that require dividing operations, has been introduced by Cosa Corp., 405 Lexington Ave., New York 17, N. Y. This machine is equipped with an automatic indexing attachment and is universally adjustable,

permitting workpieces of a wide variety to be milled. It can mill teeth on end or circumferential surfaces, or straight or helical flutes on cylindrical or tapered tools. Typical workpieces include milling cutters of all kinds. cylindrical and tapered reamers. countersinks. ratchet wheels and index plates. The Reishauer FA is so designed that several machines can be run by one operator.

A cross slide, supporting the work spindle with automatic indexing attachment, is mounted on longitudinal slide and moves at a right angle to it. Maximum longitudinal slide travel is 15 inches with variable stepless feed from ¾ inch to 8



SET YOUR MACHINES LEVEL AND KEEP THEM LEVEL WITH EMPCO LEVELING JACKS

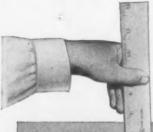
You're paying for precision. But ... are you getting it? Improper leveling and excessive vibration can seriously impair the precision performance you pay for in costly machine tools. Set your machines level and keep them level with EMPCO Leveling Jacks! EMPCO Jacks provide a solid, smoothly adjustable foundation for machine tools, large surface plates, automation lines, tool room and production

equipment of all types. Easily installed, they increase machine efficiency, reduce downtime and maintenance. Periodic releveling is a quick, easy one-man job. Combined with VI-SORB Mounting Pads, EMPCO Jacks control internal and transmitted vibrations, reduce noise and retard machine creepage. Jacks available in six styles, 25 models. Pads cut to fit.

Send Today for Descriptive Bulletin No. 100— The Enterprise Machine Parts Corporation 2715 Jerome Avenue • Detroit 12, Michigan

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LOW...

only 27/8" high!



MAGNA-LOCK model L ELECTROMAGNETIC CHUCKS

7 SIZES TO

5" x 10" 6" x 12"

6" x 18" 8" x 18"

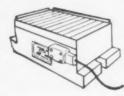
8" x 24"

10" x 15"

10" x 16"

Now — more working height under the grinding wheel plus the advantages of Magna-Lock fine pole laminated top — 22% more holding area, work pieces held to extreme edges of top — famous Magna-Lock holding power.

Here's new cost-cutting chucking for your tool room and your production machining operations. Get the full details *now*. Write Dept. MM-107.



Hanchett MAGNA-LOCK

BIG RAPIDS, MICHIGAN, U.S.A.

designers and makers of a complete line of magnetic chucks and devices.

For more data circle 544 on Reader Service Card

inches per minute. The workpiece support can be swivelled horizontally to 90 degrees and vertically to 45 degrees. The milling spindle suport is adjustable to plus or minus 30 degrees from its vertical axis and has nine speeds ranging from 63 to 400 r.p.m. The longitudinal slide, the rapid adjustment device and the cross slide clamping and indexing attachment are all electrohydraulically operated.

By means of the automatic indexing device, working operations, return strokes, dividing movements, and so on all follow each other in previously determined sequence and increments, until the workpieces has made a complete rotation. According to the manufacturer, the indexing attachment, rapid adjustment device and feed mechanism are so coordinated and in-



The Reishauer Type FA Milling Machine

PRODUCTION TOOLS WAPEX

Thin, Alternate-Angle Cutter

Free cutting, for slots and keyways. Any width from 3/16"; diameters from 3" up. Drop-forged blades, adjustable to maintain width if desired. Also made with full radius, and in interlocking style as well.



No Clapper Box Delays

Holders with Carbide Plug Tools for heavyduty planing. Other shape tools to change to when operations require. No need to remove the holder to make the change. Holders with original Apex serrated seat.

CATALOG ON REQUEST

THE APEX TOOL & CUTTER CO., INC.



SHELTON 8, CONN.

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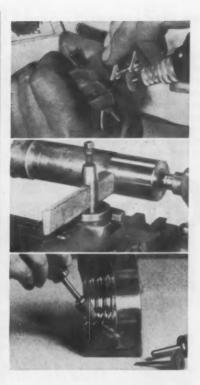
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Rubberized Abrasives

for MICRO-DEBURRING. SMOOTHING, CLEANING, POLISHING on HARD or SOFT METALS and other materials

> 4 grit textures Course - C . Medium - M Fine - F . Extra Fine - XF

WHEELS . POINTS . BLOCKS STICKS - CONES for power or manual application and dimensional control. CRATEX is sold through leading industrial supply distributors.



For actual field application reports on how CRATEX "cushioned action" can cut costs in your own operations, send this coupon.

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Please send Catalog and CRATEX Application data for:

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Stainless Steel

☐ Aluminum

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Cast Iron ☐ Heat-treated Steel

Zone State Special Alloys

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October, 1957

modern machine shop 279

terlocked that errors in manipulation are rendered impossible. Precision ground gears, used as index plates and easily changed, guarantee a high degree of indexing accuracy. This milling machine can be used for either conventional or climb milling on cylindrical or tapered workpieces.

For more data circle 126 on Reader Service Card

CONTOUR CUT-OUT ROLLERS BUILT INTO CYLINDRICAL LAPPING MACHINES

Spitfire Tool Co., 2931 North Pulaski Rd., Chicago 41, Ill., is now delivering cylindrical lapping machines with custom made contour cut-outs built into rollers to provide greater speed and accuracy for lapping cylindrical piece parts with shoulders or other angular obstructions. This ap-

proach to cylindrical lapping of piece parts was developed to answer the needs of manufacturers requiring precision lapping on large quantity runs. Instead of balancing each cylindrical piece part on the lapping roller to lap journals and other cylindrical projections, the company's contour cut-outs permit the part to be literally dropped into the correct position for proper lapping.

Contour cutouts are engineered into rollers according to specifications of individual piece parts. However, rollers incorporating these cut-outs can also be used for lapping, roughing and finishing of other cylindrical piece parts. The Spitfire Lapping Ma-



Entirely new design assures longer, trouble-free operation . . . fast maintenance. Every model is subplate mounted and piping does not have MAINTENANCE to be disturbed. Loosen four screws and replace a complete unit in minutes. Even "in-the-line" maintenance is shortened with replaceable

LESS

FASTER

MAINTENANCE

NOPAK-MATIC valves meet all J.I.C. Standards.

seats and interchangeable pilot heads.

CATALOG 105 describes in detail all of the new and important advantages of Nopak-matic 2-, 3-, and 4-Way valves. Your catalog will be forwarded promptly, upon request.

GALLAND-HENNING NOPAK DIVISION . 2758 S. 31st St., Milwaukee 46, Wis. For more data circle 547 on Reader Service Card

RING PUNCHES AND DIES STANDARDS



ROUND



BLANK



RECTANGULAR



OBLONG



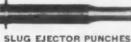
PILOT





SQUARE

TYPE R DIES



SLUG EJECTOR PUNCHE

HIGH SPEED BEVEL

& SHOULDER HEAD QUILLS



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TYPE R DIE TYPE P DIE

COMPLETELY INTERCHANGEABLE

SHIPMENTS FROM STOCK
CHOICE OF STEELS

HIGH QUALITY

LONG LIFE



NEW!

SPECIALS

Send prints or sketches for quotation on your requirements. Prompt deliveries—reasonable prices.



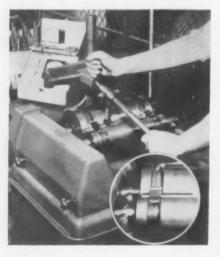
PUNCH & DIE RETAINERS

Tough alloy retainers accurately machined for Ring Punches and Dies. Ease of mounting saves time and money.

WRITE FOR ILLUSTRATED CATALOG 105

RING PUNCH & DIE, INC.

CENTON DIACE IAMESTANIO DENI VASTI



Spitfire Cut-out Rollers on lapping machine

chine's rollers have been designed to permit changeover in minutes should a manufacturer prefer to switch rollers. Rollers and their sleeve bearings remove as a single unit merely by loosening a set screw at either end. This arrangement also saves time and assures maximum accuracy when new rollers are replaced, since no testing or gaging is necessary. Set screws are simply threaded to tightest position and the new roller is known to be in correct position.

For more data circle 127 on Reader Service Card * * *

SYSTEM FOR MARKING

CARBIDE BLANKS

Newcomer Products, Inc., Latrobe, Pa., has instituted a new method of marking its NP Controlled Quality Carbide Throway Blanks for easy grade identification. The method con-



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G DIL,

Why designers specify FLEXLOC self-locking nuts

Where products must be tough . . . must stand up under vibration, shock and abuse . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts as fasteners.

Here's why: FLEXLOC locknuts are strong: tensile strengths far exceed accepted standards. They are uniform: carefully manufactured to assure accurate, lasting spring tension in the flexible locking collars. And they are reusable: rough screw threads, repeated removal and replacement, frequent adjustments will not affect their locking life.

Standard FlexLoc self-locking locknuts are available in a wide range of standard sizes and materials, to meet the most critical locknut requirements. Your authorized industrial distributor stocks them. Write us for complete catalog and technical data. Flexloc Locknut Division, STANDARD PRESSED STEEL Co., Jenkintown 22, Pa.

STANDARD PRESSED STEEL CO.

FLEXLOC LOCKNUT DIVISION

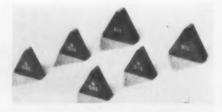


For more data circle 550 on Reader Service Card

new shop equipment . . .

sists of die pressing the grade code to a depth of approximately 1/64 inch in the face of the blank at the time the blank is formed. The indented marking is located in an area that does not affect the strength or cutting ability of the blank.

Newcomer grade identities, in use from the company's beginning, are descriptions of the grade in abbreviated form. The first letter of the code (N) identifies the manufacturer; the second letter (S or C) indicates the type of material, steel or cast iron (nonferrous), to be cut; and the numerals designate the different types of carbide. Thus, as an example of this simplified system, NS-15 represents New-



Newcomer NP Carbide Throway Blanks

comer steel cutting grade 15 carbide. With this system of applying the grade identification, the possibility of grade mixups is eliminated. Each NP Throway Blank carries its permanent marking through manufacture, processing and stocking in the company's plant, as well as in stocking, during

and after use in the customer's plant.

For more data circle 128 on Reader Service Card



THESE 40-TON PRESSES

take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are very moderately priced.

Manufacturers of Rousselle Presses

Significant savings may result if you let our engineering staff assist you. There is no obligation.

Rousselle Presses are sold exclusively through leading machinery dealers.

Choice of 25 models in 5 to 40-ton sizes.

SERVICE MACHINE CO. 2310 West 78th Street . Chicago 20, III.

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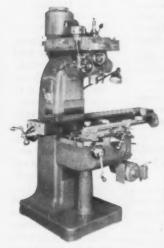
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ON THESE IMPROVED ECONOMICAL

INDEX VERTICAL MILLS

Super 55" MILL



1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

Unique square design of overarm affords more rigidity, greater accuracy... Provides extra range and capacity... More power at the cutter. No adjustment required on overarm and head after use... No need to reindicate head after moving overarm... Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage. 45"MILL



INDEX MACHINE CO.

SAA N. MECHANIC STREET

JACKSON, MICHIGAN

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new shop equipment . . .

MACHINE DESIGNED SPECIFICALLY FOR MARKING THIN WALL PARTS

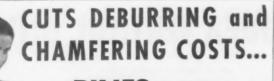
The Noble and Westbrook Manufacturing Co., 25 Westbrook St., East Hartford 8, Conn., has announced the development of a high speed auto-

matic "Dual-Dial" Machine, designed specifically for marking thin wall cup shaped parts or tubes. The Model 482, shown in the accompanying illustration, is tooled for marking a famous make garden hose accessory. The machine roll marks permanent indents of part numbers into each workpiece at a production rate in excess of 5,000 pieces per hour.

The machine features two counter rotating dials, driven by means of a

single 1/3 h.p. motor, mounted in the column of the machine. The motor is equipped with a variable pitch sheave and mounted on an adjustable bracket, which is operated by a handwheel at the side of the machine to provide for infinitely variable speed adjustment.

The work feed dial at the right rotates in a counterclockwise direction, carrying the workpieces to a reciprocating feed finger, which transfers each part onto a work mandrel on the 12 station work dial which rotates in a clockwise direction. The parts are carried through the spring loaded compensating die holder head, where the mark is applied. Parts ro-



PINES TUBE AND ROD **END-FINISHING MACHINE**



(Above) Model 600 Machine has 8-speed step sheaves (760 to 3920 RPM), pivoting stock stop. Clamps and feeds work to rotating cutters. Capacity up to 2" O.D. Average production: 600-800 tube ends per hour.

WRITE FOR COMPLETE DATA-New Catalog illustrates cost-cutting fea-tures, gives production data and complete specifications.



Fast, Easy to Operate-Clamps, Feeds, and Gauges Depth of Cut in Single Stroke.

- Interchangeable Tool Bits, Holders, Chuck Inserts.
- Combines Inside-**Outside Deburring** and Facing in Single Operation.
- Compact, Portable -Takes up Small Space.
- Other Models Available for Work up to 5" Diameter.
- Automatic Air-Operated Units and Specials to Suit Higher Production Needs.

PRODUCTION BENDING . DEBURRING . CHAMFERING MACHINERY

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ECONOMICAL, ACCURATE PRODUCTION

OF DIES AND MOLDS WITH THE LATEST

DECKEL

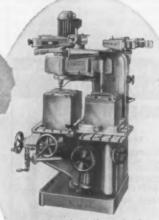
universal pantograph DIE SINKING MACHINE model KF12

Deckel die sinking machines are justly famous for their accuracy, production rate, and ease of operation. The KF12, latest and largest Deckel model, does heavy die-sinking jobs which formerly required much greater investment in equipment. Spindle speeds from 60 to 10,000 r.p.m. enable you to do rough and finish milling, as well as light engraving, on the same machine. The newly developed, "mirror image" milling attachment produces right and left hand dies and molds from the same pattern. Other important features are illustrated below.



Saddle elevating motor rapidly raises or lowers master and workpiece at the same time.

Circular forming attachment permits generating spheri-



Deckel KF12 makes rapid, accurate enlarge ments or reductions from 1:1.5 to 1:4
as well as 1:1 duplication. The
cutting tool covers an area up
10 1544" x 1544" or up to
10" x 1944".

Optical contacting device makes rough milling faster, more accu-rate. And, accurate rough mill-ing reduces time for finishing.





tion on this or other Deckel machines:

Get in touch with us soon for informa- } 2-DIMENSIONAL ENGRAYERS - 3-DIMENSIONAL ENGRAYERS UNIVERSAL MILLERS . UNIVERSAL TOOL & CUTTER GRINDERS

-nationwide sales and service of precision machine tools--from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

In Canada Contact Cosa Corporation of Canada Ltd., 1160 Lakeshore Road, Long Branch, Toronto 14, Ontario For more data circle 554 on Reader Service Card

October, 1957

modern machine shop

new shop equipment . . .

tate on the work mandrels as they travel across the face of the marking die and are ultimately ejected automatically at the rear of the machine.

The machine is equipped with an emergency stop button and a safety switch which stops the machine in-



Noblewest' "Dual-Dial' Marking Machine

.0003 HOLE LOCATION IN 1 MINUTE

EDGE FINDERS

\$2.50 NEW

POSTPAID except C.O.D. \$10.00 DELLIXE

\$2.95

THOUSANDS HAVE PROVEN and ACCEPTED THE DELUXE MODEL FOR YEARS.

. JUMPS SIDEWAYS AS SHOWN WHEN LOCATION IS REACHED

NEW .500 DIA. MODEL FOR LARGER WORK ONLY. .200

DIA ADJUSTABLE VISE STOP

HUNDREDS OF PIECES TO A .0003 TOLERANCE WITH THIS HARDENED VISE STOP THAT IS ADJUSTABLE IN ALL DIRECTIONS. ATTACH TO VISE WITH ONE 14-20 TAPED HOLE.

Dealer Inquiries Invited

422 Park Ave.

GLOVER MFG. CO. Meadville, Penna.

For more data circle 555 on Reader Service Card

stantaneously in the event that a workpiece is not properly seated on the mandrel.

For more data circle 129 on Reader Service Card

SKID ADAPTER FOR **ELECTRIC TRUCK**

A skid adapter has been designed by The Raymond Corp., 88-153 Madi-



SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists and tool cribs

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black exide finish. SET #3-17; 28 punches with indexed stand—sizes 1/2" to 1/2", by 1/4"-plus handy 17/32" size. Length 47/4". ONLY \$17.90. Single sizes available

> R. L. SPELLMAN CO. URBANA, OHIO

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After thorough research, development and tests . . .



The <u>very first</u> in its field!

NewMet*



by **NEWCOMER**

Neither a ceramic...nor a tungsten carbide...but an <u>all-new</u> high-velocity metallic cutting material

NewMet by Newcomer has opened a new field of high velocity cutting in metal-working. A product of Newcomer research and development over the past ten years, this new material is capable of cutting performances beyond the capacities of

present machines. Its extreme hardness (Rockwell "A" 95), combined with a comparatively high strength, gives NewMet the ability to perform superbly at both normal carbide cutting speeds or at speeds within the range of ceramic-type cutting tools.

Typical NewMet* PERFORMANCE DATA

Turning Low			2 Turning Medium			3 Turning Stainless		
Carbon Steel			Carbon Steel			Steel (Magnetic Type)		
SPEED	DEPTH OF CUT	FEED	SPEED	DEPTH OF CUT	FEED	SPEED	DEPTH OF CUT	FEED
1000	.001"	.001"	900	.001"	.001"	800	Up	.007"
to	to	to	to	to	to	to	to	fo
1500 SFPM	.090"	.012"	1200 SFPM	.090"	.012"	1500 SFPM	.100"	.010"

Economize now with high-velocity cutting . . . use "Years Ahead"

NewMet* by NEWCOMER

NewMet is available in "Throway" triangular, square and round inserts, and solid cylinders. Call your nearest Newcomer representative for complete data, or contact

NEWCOMER PRODUCTS, Inc.

ILLER GREATTY TOPICS

General Sales Office: 512 Franklin Ave. Pittsburgh 21, Pa.
Call: CHurchill 1-4060

Sales Offices are located in principal cities

*Pot. App. for.

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TROYKE

ROTO-INDEXER



Rapid
Positive
Accurate

CHUCK or T-SLOTTED INDEXING TABLES—FOUR MODELS

Hand operated. Unique patented block out arrangement. Can be used in vertical or horizontal position.

WRITE FOR FREE CATALOG No. 22.



TROYKE MFG. CO.

11296 Orchard Street Cincinnati 41 (Sharonville), Ohio

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DORMAN AUTOMATIC REVERSE TAPPERS

 Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Net Be Skilled.
 WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/6" in Steel — 1/2" in Aluminum.

No. 2B POSITIVE TAPPER—capacity 3/6" to 7/6" in Steel.

No. 3A POSITIVE TAPPER—copocity V_2 '' to $1 V_4$ '' in Steel— V_2 '' to $3 V_4$ '' Pipe Taps.

Priced from \$62.00 Write for Bulletin

DELIVERY

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

PRODUCTION THREADERS with Round Split . . . Button . . .

Acorn Dies.
ASTER PRODUCTS CORPORATION

THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1034 N. PLUM SEPEST, CANCASTER, PA.

For more data circle 559 on Reader Service Card

290 modern machine shop

new shop equipment . . .



Raymond Walkie Truck with skid adapter

son Ave., Greene, N. Y., for its 24 volt electric walkie truck, allowing it to handle both skids and pallets with loads up to 4,000 pounds.

The steel frame of the adapter is locked in an upright position when the truck is moving pallets. To handle skids the operator releases the lock, letting the skid adapter swing down into position over the forks. The adapters can be furnished to handle skids of any standard underclearance and have the same dimensions as the forks which are offered in 24, 27 and 30 inch widths and in 30 to 60 inch lengths.

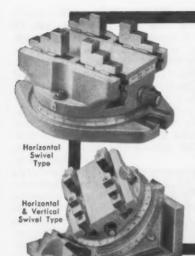
For more data circle 130 on Reader Service Card



CUTTING OIL FOR HEAVY DUTY MACHINING AND GRINDING

An emulsified cutting oil, which is said to substantially increase the efficiency of many heavy duty machining and grinding operations, has been announced by Gulf Oil Corp., Gulf Building, Pittsburgh, Pennsylvania.

October, 1957



Multi-Purpose Vises

4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Rigid in any position. Various capacities and extra soft jaws available.

Reversible
Safety Tapping
Attachments

with adjustable graduated friction drive, hardened, ground and lapped, complete with torque bar and handles. Precision made throughout.

Tested for Performance to American Standards

ALSO AVAILABLE:

- Dial Vernier Calipers Keyless Drill Chucks
- Quick Change Chucks & Collets

Immediate Delivery From N.Y. Stock.



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Phone: MOtt Haven 5-0900

"Over 25 years experience in designing and building machinery"

For more data circle 560 on Reader Service Card

October, 1957

modern machine shop

291

new shop equipment . . .

The oil, which is known as Gulfcut Heavy Duty Soluable Oil, is claimed to effectively combine the cooling ability of water with the lubricity and protection of oil. Other benefits of this soluble cutting oil, which contains a stable petro-chemical emulsifier, include production of high quality sur-

face finishes, as well as maximum protection from rust and corrosion. In the performance of grinding operations, in particular, Gulfcut Heavy Duty Soluble Oil is said to give exceptional results with good finishes and minimum wheel loading and breakdown.

Applications for the oil include heavy hogging cuts, fast fine cuts, boring and grinding of ferrous and nonferrous metals and alloys, including

tough titanium allovs. According to the manufacturer, intensive field testing of the cutting oil has proved it is highly resistant to oxidation and will not form gum on ways, slides or other machine parts. It is said to retain excellent emulsion stability, even in the hardest water. and provide a tough, thin film between the cutting tool and workpiece being machined.

The chemically active compounds, used to guard against foaming and welding of the chip to the tool, also supply additional lubrication at the cutting edge, thereby keeping tools sharp and considerably lengthening their life.

For more data circle 131 on Reader Service Card



HIGH SPEED AUTOMATIC TURRET LATHE FOR HEAVY COMPONENTS

An automatic turret lathe, designed for high speed production of heavy components, is now being manufactured by Potter and Johnston Co., Pawtucket. Rhode Island.

This automatic turret lathe has been designated as the Model 8-U. With a 40 inch diameter swing over the bed ways, chuck sizes to 30 inches and a

50 horsepower motor, the 8-U is intermediate in size between the company's present 6DREL and 10-U models.

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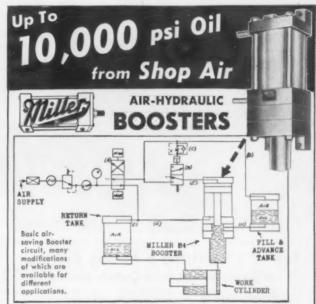
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This machine is a large heavy duty automatic turret lathe with the extra speed and power needed to remove tough allovs fast and with the extra capacity and rigidity required to produce large, heavy components quickly, accurately and economically on a fully automatic basis.

The Model 8-U has wide application in the machining operations required for manufacturing agricultural, earth moving and transportation equipment, large electrical motors, aircraft engines, airframes and many other products. The Model 8-U Turret Lathe is ruggedly constructed throughout with a heavy steel weldment for maximum rigidity.

There is a wide range of speeds and feeds with four automatic speed changes and three automatic feed changes for each set of pick-off gears. For greatest convenience and operator efficiency, all slide and spindle motions are controlled from a centralized pushbutton panel.

For more data circle 132 on Reader Service Card



No Pumps or High Pressure Valving Needed

Hook a Miller Air-Hydraulic Booster to your air line and get INTENSIFIED hydraulic power that you can vary and control at will and use for such common shop operations as punching, clamping, pressing, riveting, shearing, welding, crimping, testing, etc. Boosters save air, space, weight, require little or no maintenance and hold pressure as long as desired without additional power consumption. Models for immediate delivery.

Write For **Full Details**

FLUID POWER DIVISION flick Ready Corp 2024 N. Hawthorne, Melrose Park, III.

For more data circle 562 on Reader Service Card

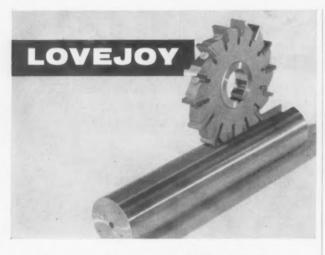
HEIGHT GAGE FOR USE WITH TEST INDICATOR

As a companion device for use with its Check Master Test Indicator, Standard Gage Co., Inc., Poughkeepsie, N. Y., has announced a special Check Master Height Gage. Because the test indicator responds to dimensional variations as low as 0.00002 inch, it was felt imperative to have a height gage adjustable to consistent tenth accuracy for use with it.

The Check Master Height Gage has a rigid 5/16 by 1½ inch column, îirmly supported by a solid cast iron base. The sliding carriage is unusually simple, but rigid, with the front of the column free of lock or adjustment screws. According to the manufacturer, desired height is easily set by a

simple lift or press at the point marked on the carriage. One finger pressure will raise or lower the carriage to the approximate desired setting - final tenth setting is then accomplished by simply turning a fine adjustment screw at the back next to the lift position.

Five hardened, ground and lapped rest pads are screwed into the underside of the base to assure maximum wear resistance and low

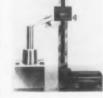


Type "5" Slotting & Milling Cutters with Pre-formed Solid Carbide Blades

The Lovejoy Type "S" has more, stronger, more rigid teeth per tool than any other inserted-tooth milling cutter. One body mills numerous metals. The most economical carbide cutter made — saves on blade replacement and on width and diameter adjustments. Outstanding performance with Minimum Maintenance! Write for Catalog No. 34.

NEW "SF" end mill with inserted solid carbide blades. One cutter body mills numerous metals.

Write for Bulletin No. 101



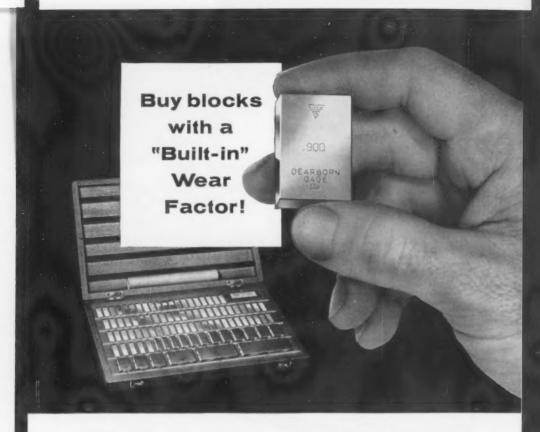
Standard Special Check Master Height Gage

LOVEJOY TOOL COMPANY, INC.

130 Main Street, Springfield, Vermont, U. S. A.
For more data circle 563 on Reader Service Card

294 modern machine shop

October, 1957



ELLSTROM CHROMIUM PLATED GAGE BLOCKS are guaranteed "minus nothing" from nominal size!

Here at last are gage blocks with a positive "built-in" wear factor! The only blocks ever produced and priced as standard with dimensional accuracy unconditionally guaranteed to be within specified millionths on the "plus" side of nominal block size and minus "zero" . . . absolutely nothing . . . undersize!

This complete elimination of the conventional minus tolerance gives you, the gage block user, three new and exclusive benefits. First, it provides positive assurance against receiving new blocks

that are actually "worn" undersize during manufacture before they are ever used. Second, it gives you finer, more practical accuracy... with the sure knowledge that every Ellstrom block you buy will start wearing foward its nominal size rather than away from it. And third, it gives you a guaranteed minimum wear factor equivalent in millionths to the full minus tolerance specified as standard for all other makes of blocks!

Write for descriptive literature containing complete price information today!

ELLSTROM STANDARDS DIVISION



DEARBORN GAGE COMPANY

"Measuring in Millionths for Three Generations"

22038 Beech Street • Dearborn, Michigan

REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

For more data circle 564 on Reader Service Card

new shop equipment . . .

friction action when moved on surface plate. According to the manufacturer, this construction also eliminates error from air cushion action common to ordinary flat bottom bases.

As the base does not protrude beyond the column, maximum clearance is assured for close positioning. Tight coupling of the gage is also provided so that errors in indicator readings caused by overhang leverage are avoided.

For more data circle 133 on Reader Service Card



TAPPING HEAD

Spindles for

ORIGINAL

EQUIPMENT

MANUFACTURERS.

REBUILDERS

AND USERS

1912

Burg Tool Manufacturing Co., Inc., 15001 South Figueroa St., Gardena,

Calif., has announced its No. 17,000 Burgmaster Tapping Head. It has a positive drive, is ball bearing mounted and provides No. 10-1/2 inch NF tap capacity on the Burgmaster Model 1C Turret Drill. The housing is cast aluminum: all shafts, gears and the chuck are of tough alloy steel, heat treated and ground. Engagement of forward and reverse is through positive jaw clutches. One rubberflex



STANDARD Super-Precision Spindles represent the ultimate in rugged construction, trouble-free maintenance and adaptability. In use on a thousand jobs in industry the nation over. Every Standard spindle is "checked out" electronically in our sound-, vibration-, dust-proof laboratory before approved for delivery. Write today for catalog.

Booth 1641 • Metal Show Chicago Amphitheatre • Nov. 4-8

the STANDARD electrical tool co.

SUPER-PRECISION SPINDLE DIVISION 2487 RIVER RD. • CINCINNATI 4, OHIO

For more data circle 565 on Reader Service Card



Burgmaster No. 1C Tapping Head



s

"An irregular-shaped hole being ground to within, 0002" on the No. 2 Moore Jig Grinder. The machine can do contour grinding of almost any size and shape." — From facilities booklet of August W. Holmberg & Co., Inc., Flushing, N. Y.



"FACILITIES, FACILITIES, FACILITIES..."

How Leading Tool and Die Shops Across the Nation Feature MOORE Jig Borers and Jig Grinders

Today, top contract tool and die shops often rely on illustrated booklets to sell prospects on their facilities. And they often rely on pictures of their Moore Jig Borers and Jig Grinders to indicate the degree of precision work they can do. It's particularly significant that leading contract shops choose Moore machines for "double duty"—in the toolroom and on the printed page—for these owner-managed firms are understandably deliberate and judicious in selecting machine tools. Write today for detailed bulletins on Moore's top-billed toolroom teammates.



MOORE SPECIAL TOOL COMPANY, INC. 730 Union Avenue, Bridgeport 7, Conn.

Motes, contours and surfaces Moore's all-new book tells you how to produce tools, dies and precision parts the modern way, 424 pages, 495 illustrations. \$5 in U.S.A., \$6 elsewhere.



ADD (MOVE) TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

FOr more data circle 566 on Reader Service Card

new shop equipment . . .

collet covers the range of the 1C tapper. All taps are tang driven to prevent slipping of the tap.

For more data circle 134 on Reader Service Card



Taylor Vise is available in over 24 models

HOLD DOWN VISE

Wharton Unitools, P. O. Box 202, Valley Stream, L. I., N. Y., is now marketing the Taylor Hold Down Vise. This machine vise is fitted with hold down jaws, which are claimed to eliminate parallels, hammering, buckling and checking, but simplify the holding of close tolerances, accurate seating and one hand tightening and operation.

This vise is available in over 24 models, with from 3 to 8 inch jaws. The 3 inch vise—Model 861—will take

a work part of 7 inches and will also take odd shaped parts. The 8 inch vise will take up to 18 inches between jaws.

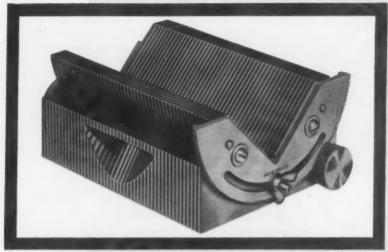
For more data circle 135 on Reader Service Card

TRACER LATHE IS IMPROVED

An improved tracer lathe has been designed by Elgin Tool Works, Inc., 1770 Berteau Ave., Chicago 13, Ill., to duplicate countless piece parts from either flat or round templates.



precision setup for precision grinding



with the new

ANTON MAGNETIC ADJUSTABLE V-BLOCK

This unique precision workholder permits quick and accurate setups, saving time, effort and money in grinding operations.

Laminations are held without pins or rivets and cannot shift, and a laminated insert is furnished FREE for larger, flat work. The Anton Adjustable V-Block can also be used on drill presses or other machines equipped with magnetic chucks.

Compare these distinctive features:

- Parallelism: ± .00005" over entire length
- Maximum setting: 90° angle
- \bullet Vernier accuracy: \pm 15 seconds
- Size: 6" long, 41/2" wide, 21/2" high
- Unsurpassed for layout, toolroom and production



Write today for complete technical data to:

Machine Works

1226 Flushing Avenue, Brooklyn 37, New York

Standard & Magnetic Parallels • Standard & Adjustable V-Blocks • Diamond Holders • Milled Blanks

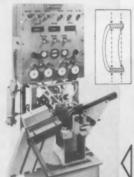
For more data circle 568 on Reader Service Card

October, 1957

modern machine shop

299

RELIABILITY IN AUTOMATION GAGING!



Federal's hard-headed experience acquired in the designing and building of many diversified types of automatic gages can meet most control and inspection demands using basic, standardized components. This means lower cost to you ... and greater reliability of performance. Ask your nearest Federal representative to discuss you own needs.

FEDERAL PRODUCTS CORPORATION 71410 Eddy Street · Providence 1, R. I.

ILLUSTRATED IS GAGE FOR HIGH SPEED AUTOMATIC INSPECTION
Rotates piece... Explores both I.D. and O.D.-2 places o
Classifies and sorts — 3 categories o
Complete cycle — 3 seconds!

Ask FEDERAL First

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic - for Inspecting, Measuring, Sorting, or Automation Gaging

For more data circle 569 on Reader Service Card

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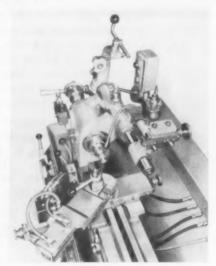
new shop equipment . . .

Parts are duplicated with accuracy as close at 0.0003 or less. The unit is provided with pushbutton starting for automatic cycle of carriage and spindle and pushbutton stop of automatic cycle, which returns the carriage to starting position.

A carriage limit switch is integral with the carriage stop and is fitted to the bed. During an automatic cycle, the switch, when closed, will initiate tool relief and return the carriage to start position.

Motor direction and speed are controlled by the spindle drive control levers mounted by the head stock control. A lever mounted on the pedestal provides speed from 120 to 2,900 r.p. m. of the spindle.

For more data circle 136 on Reader Service Card



Elgin Tool Improved Tracer Lathe

GEAR GRINDING MACHINE

The Fellows Gear Shaper Co., 78 River St., Springfield, Vt., is now manufacturing the No. 12 Fellows-Reishauer Gear Grinding Machine. This machine is capable of grinding spur and helical gears up to a 12 inch o.d. and a 6¾ inch face width. The pitch range is determined by the lead screw selected. Two lead screws are available, one covering from 6 to 48, and the other from 20 to 120 diametral pitch.

On the Fellows-Reishauer the gear tooth shape is generated by an emery wheel on which a helix has been developed. The tooth section of the wheel is usually that of the basic involute rack. In operation, the involute is generated as the grinding wheel turns in harmony with the work while the work passes axially by the wheel. There is no mechanical connection between the wheel spindle and the work spindle, these being driven by synchronous



Fellow-Reishauer Gear Grinding Machine

motors. Grinding is done in both directions of travel of the work slide. The machine setup is simple and fast, making possible the grinding of single piece lots and long production runs.

For more data circle 137 on Reader Service Card

The most for your money standardize on **FEDERAL** Dial Indicators

- Greatest selection graduations from .00005" to .005". Regular Types 5 sizes, 76 models; Perpendicular Spindle Types 4 models.
- · Consistent improvements and new ideas.
- Known accuracy and dependability
- One make of instrument simplifies your stock and maintenance problems

Get what you need in Dial Indicators and Accessories from Federal (direct from our branch offices too). Ask for 28-page catalog—all Dial Indicators.

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71410 Eddy Street · Providence 1, R. I.



FOR RECOMMENDATIONS IN MODERN GAGES . .

Dial Indicating, Air, Electric, or Electronic - for Inspecting, Measuring, Sorting, or Automation Gaging

For more data circle 570 on Reader Service Card

new shop equipment . . .

ELECTRONIC GAGING SYSTEM

An electronic system of precision measurement has been announced by Federal Products Corp., 7148 Eddy St., Providence 1, R. I. The basic unit of this system is a small size, hermetically sealed gage head, known as the Electro-Probe, whose unique method of electro magnetic operation provides unusual operating capabilities. Amplitude of the continuously produced electronic signal is claimed to maintain such exact linear relationship to contact movement that available electrical instruments have not had sufficient sensitivity to measure the error. Linear output is available over an exceptionally wide range of contact travel (0.060 inch). Electrical and mechanical sensitivity of the Electro-Probe is capable

> of providing magnifications and accuracies which well exceed the needs of present day precision gaging requirements.

> The Electro-Probe head, measuring approximately 11/2 by 21/2 inches by 1/2 inch, can be used with various types of contacts and contact mountings. depending on the overall accuracy required, and can be operated with any one of several types of amplifiers according to application needs. Gage heads are interchangeable and may be employed either jointly of in rapid succession by switching.

The first publicly announced application of the Electro - Probe System is an electronic test indicator. Designated



For more data circle 571 on Reader Service Card

Here's how you can drill or tap OVER A MILLION DIFFERENT HOLE COMBINATIONS on any drill press in any operating position!



Universal Ball Joint Adjustable Spindle MULTIPLE DRILLING AND TAPPING HEADS





Model 600 (6-spindle circle type) head set up for drilling on a standard drill press

one of three models, circle or straight

Featuring Ettco's exclusive

Lubricated Ball Joint with Neoprene Covers

These unusually versatile, smooth-running heads give you the dependable, high-production accuracy needed for most small hole drilling and tapping operations. Glance at some of the built-in advantages that make these compact light weight heads such an outstanding development:

Wide range of spindle settings: Fast and easy | 1:1 ratio of drive to spindle: Ideal for producto locate in almost any pattern, even while running. Excellent rigidity, too.

Add or remove spindles quickly: That's because they're keyed into the gear case. They're inter changeable on all three models.

Tap or drill capacities up to 5/16" in steel: Each spindle capable of transmitting 1/2 H.P.

tion tapping.

No reversing meter needed: Attach to any drill press with standard Ettco face plate - they're ready to work without special engineering.

Long trouble-free service: Durable chromenickel spindles are one-shot lubricated and run in oilite bushings for smoothest performance.

And 100% guaranteed to do the job they're made for!

Want more details? Write today for bulletin 600B. Authorized Etteo distributors throughout the U.S. and Canada

The only full-line manufacturer of drilling and tapping equipment for the entire small hole field

ETTCO TOOL & MACHINE CO., INC.

598 Johnson Avenue, Brooklyn 37, N.Y.

Chicago · Detroit · Los Angeles · Indianapolis · Hartford · Houston TAPPING ATTACHMENTS . MULTIPLE HEADS . STANDARD AND SPECIAL DRILLING & TAPPING UNITS AND MACHINES . INDEXING FIXTURES

For more data circle 572 on Reader Service Card

as the Model 230P-2, it includes the Electro-Probe Gage Head and a light-weight, completely portable, battery powered, transistor amplifier, plus the accessories.

It is quickly applied to precision measurement on surface plate or machine and is particularly suited to gen-

eral inspection and patrol inspection

applications.

Transistor operation permits the unit to be completely independent of external power. Extremely light, but positive gaging pressure (less than 5 grams) permits using the gage head on any type of conventional test stand, comparator base or holding fixture without danger of inaccuracy due to deflection of posts or arms. Two ranges are instantly available by switching

(0.004 inch range at 0.0001 inch graduation, or 0.002 inch range at 0.00005 inch graduation). Gaging pressure is uniform throughout the range: actual change is less than 0.1 gram per 0.001 inch movement of the clutch mounted contact, which has a total friction free travel of 0.060 inch plus and minus. Full scale zero adjustment permits flexibility in positioning the head and avoidance of close time consuming mechanical adjustments. Both gage head and output cord are unaffected by oil and water.

Because of its exceptional linearity, the Electro-Probe may be mastered anywhere within its range. Since warm-up is

FIRST for secondary finishing...



SCHAUER SPEED LATHES

Filing cast iron flange with variable speed type VA3CCA Schauer Speed Lathe.

Schauer Speed Lathes provide the most economical method for performing secondary finishing work on metal and plastic parts. Do filing, trimming, deburring, lapping, polishing, etc., faster, at lower costs on Schauer Speed Lathes. Many sizes and models with holding devices to suit the job. Speed your production with Schauer Speed Lathes. Write for Catalog No. 530.

OUR 50th YEAR

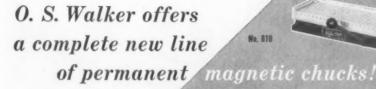
SCHAUER MANUFACTURING CORP.

4501 Alpine Ave.

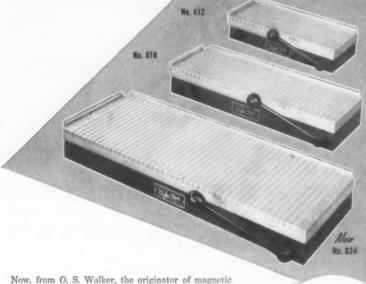
Cincinnati 42, Ohio

For more data circle 573 on Reader Service Card

957







chucks, comes a completely new, full line of chucks, with the most permanent magnets ever produced! They're ceramic*, with many times the coercive force of alloy magnets. The face is all steel, with no soft insulating material. These chucks offer many important advantages: -

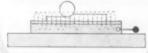
- · Weight is 50% less than conventional permanent chucks; minimizes reciprocating table inertia.
- · Their low, low height gives greater-than-ever machine
- · Fine pole divisions give maximum holding power.
- · All magnetic fields are controlled to prevent magnetization of machine table or ways,

Write for details.

Patent applied for,

... perfect for milling, too!

These new chucks are perfect for milling or planing due to their exclusive construction. Cutter is constantly demagnetized as it progresses, with no fouling of cutter and work with chips!



† O. S. Walker magnets are polarized horizontally!

COMPANY, INC. WORCESTER 6. MASSACHUSETTS

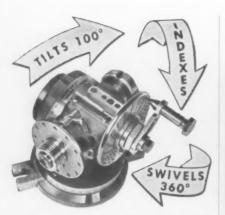
Permanent magnetic and electro-magnetic rotary and rectangular chucks. demagnetizers, lifting magnets, vacuum chucks.

For more data circle 574 on Reader Service Card

modern machine shop

For more data circle 573 on Reader Service Card

October, 1957



304

FOR FASTER PRODUCTION

THE ELLIS

DIVIDING

Although it is built to fine instrument standards, the ELLIS is a really rugged tool room or production tool that's designed for unusual versatility. Its universal motions - swiveling in two planes - will save time and increase profits and accuracy on your millers, grinders, drill presses and jig borers. It has 61/2" swing, or 11" swing when used with riser blocks. Work may be held between centers, or in chucks or collets. To save rehandling of work, and to save money, investigate the ELLIS by writing for complete details!



76-H MAMARONECK AVE. WHITE PLAINS, N. Y. For more data circle 575 on Reader Service Card new shop equipment . . .



Federal Electronic Gaging System is shown here in use. Inset shows close-up view

practically instantaneous, this unit may be turned on and off at the will of the user without penalty, greatly conserving useful battery life which will provide approximately 400 hours of reliable operation.

For more data circle 138 on Reader Service Card

BAND SAW GUIDE

A band saw guide, designed on a radical new principle and guaranteed to operate satisfactorily on saws cutting any material at any speed or load, is being produced by Carter Products Co., Inc., 426 Wm. Alden Smith Bldg., 30 Ionia Ave., South West, Grand Rapids 2, Mich. The unit, designated as Guidall 400, offers a guide with the edge of the blade riding on the outside perimeter of the thrust wheel and with the thrust wheel and support rollers all operating on the inner raceway of the bearing. The Guidall, which handles blade speeds up to 15,000 f.p.m.,



TO REDUCE WELDING COSTS JETWELD IT!

Lincoln Jetweld iron-powder electrodes increase welding speeds as much as 50%. Higher welding currents, greater deposition rate, and self-cleaning characteristics make possible drastic reductions in welding labor costs.

Weld appearance is smoother, approaching the bead quality of an automatic weld.

The Lincoln Jetweld family of iron-powder electrodes is available in four different classifications to meet a wide variety of welding requirements.

FABRICATORS!

For complete information on Jetwelding and Jetweld electrodes, including physical properties and procedures, write for Weldirectory SB-1351.

THE LINCOLN ELECTRIC COMPANY

Dept. 3516, Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

When Jetweld electrodes Have higher Adeposition rates

Yet give easiest operating qualities why
use anything
but Jetweld?

For more data circle 576 on Reader Service Card

For more data circle 575 on Reader Service Card 306 modern machine shop

the bearing. The Guidall, which handles blade speeds up to 15,000 f.p.m.,

October, 1957

new shop equipment . . .

is said to be 166 per cent more efficient in both speed and load. It is reported to work equally well on light and heavy loads and will handle thrust loads to 175 pounds at maximum speeds and to 500 pounds at lower speeds. It accommodates saw blades from 3/16 inch to 21/2 inches. The thrust wheel of the

guide is positioned so that the back of the blade rides on the outside perimeter of the wheel, instead of along the side of the wheel as is commonly done. This is a true radial application and permits the use of a smaller bearing which can operate at higher speeds and take a heavier thrust load. The new design principle offers a true non-friction guide. For application requiring a wiping action on the blade, this guide

is offered with support blocks instead of rollers. In addition to the efficiency features. the Carter Guidall offers unusual convenience of adjustment. Support wheels and support blocks adjust to accommodate the thickness of the blade, or adjust for wear. without having to move the guide itself. The unit may be converted from a support wheel to a block setup by simply replacing the wheels with sup-

port blocks. For more data circle 139 on Reader Service Card

Well-known makes of home appliances are gaged with Comtorplug



COMTORPLUG. Interchangeable expanding plugs gage simple or special bores from 1/8" to 10" diameter.

UNIQUE ADVANTAGES

- . Large dial with .0001" graduations.
- Indicates actual size, a fixed
 not passing reading.
- Portable no wire, hoses, stands or electronic gear.
- Positive 2-point gaging automatic centering. · Assured accuracy regardless of
- who operates it . Shallow holes, deep holes, in-
- side splines, open-end holes gaged easily.
- · Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes
- Will gage work in the machine.
- · A shop tool for all-day every day use

Anybody can use Comtorplug with positive accuracy . . . at machine, bench, lab . . . anywhere, since it's unencumbered by wires, hose, heavy base or electronic gear. The same amplifier fits all plugs and fixed readings show ACTUAL SIZE, front or back taper, ovality, etc. Whatever problem bore you have in mind, COMTORPLUG may be the answer.

COMTOR COMPANY 64 Farwell St. WALTHAM 54 MASS.



GET THE FACTS - REQUEST BULLETIN 50

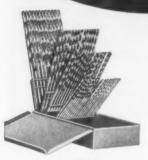
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Band Saw Guide New way to buy the finest drills made!

ACE

TAPER LENGTH DRILL SETS



WIRE SIZE SETS





- They're made of top quality high speed steel heat treated in continuous mill length bars to assure the ultimate in uniform hardness, extra toughness.
- They're ground-from-the-solid after hardening by special Ace-originated processes which produce more highly polished flutes plus keener, stronger cutting edges . . . finer, longer lasting drills.



LETTER SIZE SETS

Call your local distributor or write direct today for details on this NEW WAY TO BUY THE FINEST DRILLS MADE!



ACE DRILL

ADRIAN, MICHIGAN

Originators of Ground-from-the-Solid High Speed Steel Drills

For more data circle 578 on Reader Service Card

GET THE FACTS - REQUEST BULLETIN 50

For more data circle 577 on Reader Service Card

modern machine shop

October, 1957

for the FIRST TIME . . . a tap specifically for screw machines. Shorter, more rigid shank. Cuts clean and free without "bellmouth." Reduces tap breakage. Lasts longer. Excellent for all machinable metals. Spiral point, high speed steel, ground thread . . . plug or bottoming types. Write for complete information. STUB SCREW MACHINE TAPS WIDE RANGE OF SIZES FROM STOCK AT THE PRATT & WHITNEY OFFICE NEAR YOU

For more data circle 579 on Reader Service Card

* * * *

new shop equipment . . .

MOTOR DRIVEN DIE FILING **MACHINE FEATURES TILTING TABLE**

The High Speed Hammer Co., 315 Norton St., Rochester 21, N. Y., has announced the availability of a small size bench type die filer for sawing small dies, jigs and templates. Featuring a tilting table, the unit uses standard 31/2 or 4 inch parallel machine files as small as 3/64 inch in diameter.

Positive accuracy in operation is said to be assured by a rigid mounting design in the yoke holding the files. The yoke itself reciprocates on two hardened steel rods traveling in precision machine guides. Other specifications are: 6 inch diameter tilting table; 1 inch stroke; 31/2 inch throat; and 11/2 inch work thickness capacity. The machine is operated by a 1/4 h.p. motor at 375 strokes per minute.

For more data circle 140 on Reader Service Card



High Speed Die Filer with tilting table

for more data circle 378 on header Service Ca

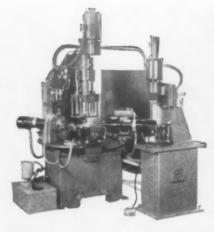
October, 1957

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modern machine shop 30

SINGLE OPERATOR DUAL MACHINE FOR DRILLING AND TAPPING

A machine, designed to speed up multiple drilling and tapping operations with Govro-Nelson Automatic Drilling and Tapping Units, has recently been developed by the Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. This is a two position machine which incorporates two vertical and five horizontal units for drilling and tapping 12 holes in three similar parts. Two holes are drilled in one position and ten holes are tapped in the second position. The operator alternately loads the two machines. completing the drilling operations on a manually clamped fixture (shown at the right in the accompanying illustration) and tapping ten holes simultaneously on the second machine (left) which automatically clamps, taps and releases the part. The output of the machine is 300 parts per hour.



Govro-Nelson Drilling and Tapping Machine

By making changes in the number and arrangements of the units, the machine is readily adaptable to a variety of operations.

For more data circle 141 on Reader Service Card



modern machine shop

October, 1957



For more data circle 581 on Reader Service Card

* * * * *

new shop equipment . . .

ROTARY DIVIDING TABLE

A complete line of Imperial Precision Circular Tables, recommended for checking and lay out operations. as well as for use with jig borers and other machine tools, has been introduced by Opto-Metric Tools, Inc., 137 Varick St., New York 13, N. Y. These tables are available, both in the plain rotary and the tilting types, in seven different sizes between 10 and 40 inches in diameter. They are of high grade accuracy not only in divisions, but also in flatness, true running of the scraped surface and center hole.

The table graduation is in degrees over the full circle of 360. The table dial graduation is in 30 seconds of arc and the vernier reading is in 1

second of arc. The diameter of the dial, 51/2 inches, is exceptionally large for easy reading in 1 second of arc.

To insure constant accuracy, the tables are furnished with a circumferential compensating cam, the contour of which is determined by optical testing. The dividing accuracy of Imperial Rotary Tables is guaranteed to be within plus or minus 10 seconds of arc.

For more data circle 142 on Reader Service Card



Imperial Precision Rotary Dividing Table

For more data circle 580 on Reader Service Card

October, 1957

modern machine shop

311

TWO DIMENSIONAL DUPLICATOR FOR CONTOUR PROFILING ON VERTICAL MILLERS

J. M. Kalins Co., 1575 Railroad Ave., Bridgeport 5, Conn., has announced the Regent Model R-200 Fluid Motion Duplicator that is said to permit fast, easy and exact two dimensional contour profiling on any vertical miller in use today.

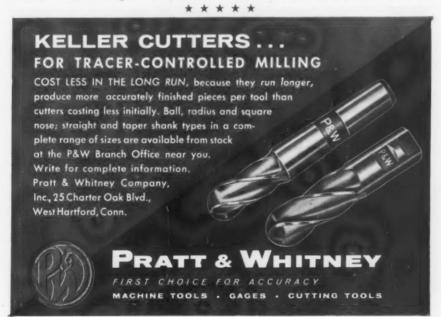
The unit mounts on any table by tightening only four boults. According to the manufacturer, this model is a genuinely self-contained unit combining all the extra sensitivity of true fluid motion with new and unique rigidity provided by a base casting mounted follower arm. The machine is controlled by a single lever.

The Model R-200 is equipped with a rugged adjustable built in friction brake. The free moving table is float mounted on precision ball bearings in circular ball bearing raceways. The



Regent Model R-200 Fluid Motor Duplicator

capacity of the unit is 6 by 6 inches with a 1:1 ratio with the master.
For more data circle 143 on Reader Service Card



For more data circle 582 on Reader Service Card

modern machine shop

October, 1957

new shop equipment . . .

MACHINE FOR REAR AXLE DIFFERENTIAL GEAR CASES

The Cross Co., Park Grove Station, Detroit 5, Mich., has developed a Transfer-matic for machining one piece rear axle differential gear cases.

The work performed by this machine includes the difficult operations on the inside of the part which were formerly performed on single station machines. Machining two parts at a time, the Transfer-matic rough and finish forms the two spherical seats for the pinions; rough and finish bores and faces the two seats for the side gears; drills, bores and reams the pinion shaft hole; drills and reams the lock pin hole; and drills, chamfers, spot-faces and reams 12 ring gear mounting holes. The manufacturer states that

the rated capacity of the machine is approximately 212 pieces per hour at 100 per cent efficiency.

The gear cases are transferred through the machine on pallet type workholding fixtures. Part location in the pallet fixtures is from the ring gear seat and one of the two end bearing diameters, which are turned and ground in previous operations.

The machine features a unique system for transferring, locating and clamping the pallet fixtures. Movement from station to station is accomplished with two reciprocating transfer bars. At the forward end of the transfer stroke, elevators lift the pallets from the transfer bars into engagement with fixed locating pins and rest buttons, which are attached to overhead bridge structures. Wedges then backup the elevators to secure the pallet fixtures in final position.

In stations where internal boring



Solid Reasons why... Jarvis solid RBIDE TOOLS BREAK PRODUCTION RECORDS



Jarvis Solid Carbide Tools enjoy an enviable reputation for outstanding quality and precision. Standard or custom tools are

thoroughly inspected, guaranteeing the closest possible tolerances. Through constant research and testing, Jarvis is able to recommend the specific carbide grade for maximum performance.



With Jarvis Solid Carbide Tools production days become hours . . . product machining costs tumble! Specific case histories* prove tre-

mendous savings in tool life, production hours and machinists time. End worry and waste on conventional milling! On hard-to-machine materials, you'll save with Jarvis Solid Carbide Tools, Let Jarvis recommendations solve all your tooling problems! *Available on request in writing.



Jarvis representatives are specialists in Carbides and power tools and their applications, 165 representatives are as near as your

telephone and are available for consultation on standard or custom tools. A Jarvis representative—specializing in service—can trouble-shoot your tooling problems in your plant, and solve them economically.

- Tungsten Carbide Rotary Files Boring Bits
- Solid Carbide End Mills
- Special Mills
- Solid Carbide Reamers
- Internal Grinding Tools
- Solid Carbide Drills
- Boring Tools
- Special Solid Carbide Tools
- Rotary Files
- Midget Rotary Files
- High Speed Rotary Files
- . and Custom Solid Carbide Tools.



Send today for catalog describing hundreds of -Production Increasing-Precision Ground Carbide Tools completely illustrated.

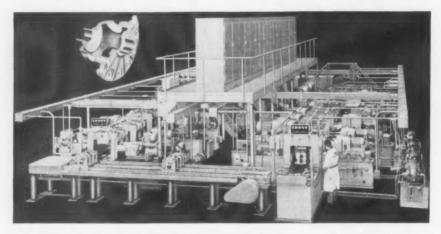
CORPORATION POWER TOOLS FOR INDUSTRY MIDDLETOWN, CONNECTICUT

For more data circle 584 on Reader Service Card

114 modern machine shop

October, 1957

new shop equipment . . .



Cross Transfer-matic. Inset shows cut away view of gear case and machined surfaces

and facing operations are performed, the overhead bridges also carry the cutters. As the pallets are elevated to the clamped position, the cutters enter the part through the casting window, and thus find their correct location relative to the gear case. After the cutting operations are completed, the elevators lower the pallets back onto the transfer bars, which carry them to succeeding stations.

Transfer and indexing errors are said to be minimized because the locating pins are positively fixed and do not move.

Side gear and pinion locations are maintained in closer relationship because the parts are not relocated and clamped between operations, thus improved quality is one of the advantages of this machine.

The machine is constructed to J.I.C. standards, has hardened and ground ways and complete interchangeability of all standard and special parts.

For more data circle 144 on Reader Service Card



For more data circle 585 on Reader Service Card



PROVE IT TO YOURSELF with Precision's NO-RISK UNCONDITIONAL GUARANTEE

Order a dozen or more Precision drills in the size or sizes you use. Put them to a test in your plant under your own conditions. If you find that Precision drills are not what we claim them to be in performance. accuracy and economy...return the unused drills and we will cancel your ENTIRE BILL... without quibble or question!

PRECISION TWIST DRILL & MACHINE CO.

10 Woodstock St. - Crystal Lake, Ill. - Phone: Crystal Lake 2040

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modern machine shop

October, 1957

new shop equipment . . .

10 INCH ABRASIVE BELT GRINDER

316

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., recently announced an addition to its line of heavy duty abrasive belt grinders. This 10 inch Abrasive Belt Grinder, Model PD-10, is especially suited for dry, flat surface grinding, polishing and deburring of castings, die castings, forgings, plastics, glass, wood, ceramics, sheet metal and similar parts.

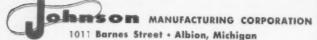
The Model PD-10 can be quickly and easily adjusted to vertical or horizontal operating position. The 10 by 21 inch steel platen can be reversed top for bottom and side for side. The platen offers a working surface large enough to allow parts to contact the

entire width of the belt. Multivee-belt drive, 5 or 71/2 h.p. TEFC motor and dynamically balanced drive and driven pulleys insure smooth operation. Automatic air or spring belt tensioning is available; however, automatic air tensioning is recommended for longer belt life and better finishing results. The



Model J (Heavy-Duty) (Wet or Dry Models)

Johnson Model "J"... the heavy duty band saw that speaks for itself. No other saw handles so many operations so easily and so economically. Why pay more when a Johnson Model "J" can cut the 10" rounds, 18" flats and odd shaped steels of your shop in such labor saving time. The Big "J" is completely automatic—and is available in a wet or dry model, both with variable speed and centralized control system. You can't afford to miss any information on the rugged Johnson Model "J". Contact your dealer today!



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R. J. R. KELLY CO.
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Berkeley, Calif.



Hammond 10 Inch Belt Grinder

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October, 1957

modern machine shop

317

OERLIKON

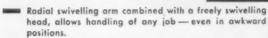
UB 2

ALL ANGLE

PRECISION

BORER

The UB 2 performs hundreds of general and specialized workshop operations—drilling, milling, countersinking, tapping, precision and center boring, reaming, facing, trepanning, etc.



- Boring head can be canted to any angle (360°) and latched accurately in the vertical and horizontal positions.
- Spindle speeds variable from 30 to 3070 rpm.
- Accessories include precision chuck, tapping heads, collets holder, adjustable boring head, facing and turning head, trepanning tool, boring bars, etc.
- Portable—take it right to the job.

Write for detailed information and prices to:

Mr. François Perret

c/o OLKON RESEARCH CORPORATION

13823 West Eight Mile Road Detroit 35, Mich.

(Some exclusive territories still available)

For more data circle 588 on Reader Service Card

For more data circle 587 on Reader Service Card

318 modern machine shop October, 1957

new shop equipment . . .

standard belt speed is 3,800 s.f.p.m., but other speeds are available.

The heavy duty construction - net weight 850 pounds - provides the Model PD-10 with enough weight to stand up through continuous production use.

For more data circle 145 on Reader Service Card

DRILL HEAD

Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y., recently introduced the Universal Joint Drilling Head, which is now available up to 3 Morse Taper sockets. This Universal Joint Drilling Head allows a maximum drilling pattern of 14 inches without extension spindles. It is available with up to 12 spindles. Heads with a greater number of spindles and larger

> diameter capacities are available on special order. Case, cover, frame and locator arm casting are made of aluminum. All spindles are hardened and ground with gears turned on spindles. The drive gear has heavy duty grooved ball thrust bearings on the top and bottom of the gear and heavy duty roller bearings at · the top and bottom. All drill spindles have double needle bearings.

For more data circle 146 on Reader Service Card



Errington Universal Joint Drilling Head

500 lb. Lifter-NOW \$210 f.o.b. Chicago

Pays for itself over and over again in time saved and by avoiding lifting injuries in moving dies, machine parts and stacking. Can be used as adjustable height work table. Rugged, simple

> construction, with few moving parts, has high safety overload factor. Automatic clutch holds load at any height.

Specifications: platform 24" x 24", lifting height 4' 6". Overall height 6' 0". Width 24". Foot operated floor lock.

SHOPLIFTER

This sturdy, general purpose lifter makes it easy for one man to handle lifting jobs quickly and with complete safety.

Order Today-Free Trial

specify 10 day free trial, with full credit return privilege. 1000 lb. and 2000 lb. Shoplifters also



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October, 1957

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October, 1957

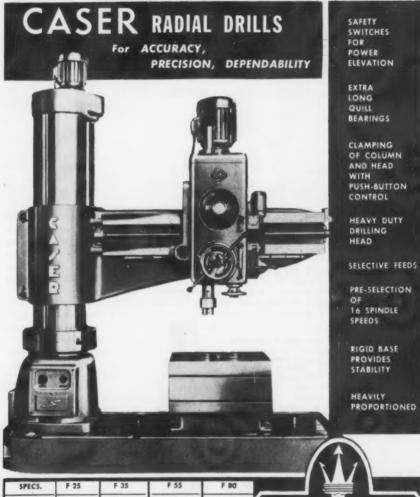
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57

modern machine shop

319





SPECS.	F 25	F 35	F 55	F 80			
Arm Length Col. Diam. Drilling Cop.	2' 6"	3', 4' 10", 12' 13%"	4', 5', 7' 14", 16", 18" 2 316"	5', 7', 8' 18", 20", 22" 3 %16"	(MAS	SĒF	TAS
H. P.	1.8-2	3, 5	6, 5	9		~	

DEALER INQUIRIES INVITED WRITE FOR FULL INFORMATION MASERATI CORP. OF AMERICA, 46 Sea Cliff Ave., Glen Cove, N. Y.

For more data circle 590 on Reader Service Card

new shop equipment . . .

IMPROVED PILOT AIR CONTROL VALVE

320

Hanna Engineering Works, 1758 Elston Ave., Chicago 22, Ill., recently introduced its Flo-Pilot Series of pilot valves. A basic part of this valve is a small synthetic rubber boot which chaps in place around the valve stem,

sealing all critical parts from dirt and abrasives, thus increasing valve life.

Aluminum, stainless steel and molded nylon are used extensively to give the valve long service life by providing resistance to corrosion. The valve is compact with clean lines, which give it an attractive appearance.

The basic valve has five optional actuating heads — palm button, ball cam, lever, locking lever and mechanical link clevis. These are interchange-

able in less than 30 seconds by removing two pins. Parts can be interchanged without disturbing the piping. Any of these valves can be base, panel or wall mounted. The same valve can be used as either a two or three way valve. Either the two or three way valve can be normally open or normally closed to inlet pressure, depending upon the piping arrangement. For more data circle 147 on Reader Service Card





We manufacture all types of adjustable, fixed center and individual lead screw tapping heads.

BURNS STREET . CINCINNATI 4, OHIO

For more data circle 591 on Reader Service Card



Hanna Flo-Pilot Control Valve

For more data circle 590 on Reader Service Card

October, 1957

modern machine shop



Quality Tool Hardeners Choose Sentry Furnaces

For High Speed Steel tool hardening many of the country's leading manufacturers rely on Sentry Furnaces. The Sentry Diamond Block Atmosphere makes the difference.

The chemically constant and truly neutral Sentry Diamond Block Atmosphere permits ample soaking at hardening temperatures to assure maximum hardness in all high speed or air hardening steels. Tools retain their initial sharp, clean-cut edges absolutely free from scale or decarb, with no atmosphere regulation or analysis required.

Consistent high quality tool hardening reduces production costs. That's why leading manufacturers choose Sentry Furnaces.

Avail yourself of Sentry quality. Consult Sentry for free demonstration hardening on your own tools.

Visit us at Booth 150, The 39th Metal Exposition, Chicago, Nov. 4-8



Sentry ELECTRIC FURNACES

Request Catalog Y-23. Write THE SENTRY CO., FOXBORO, MASS.

For more data circle 592 on Reader Service Card

UNITED STATES DRILL HEAD CO.

For more data circle 591 on Reader Service Card

Hanna Flo-Pilot Control Valve

October 1057

322 modern machine shop

new shop equipment . . .

TWO SPEED MACHINE VISE

Two HYLO Precision Machine Vises, incorporating two speed closing and gripping traverse with open jaw capacities up to 12 by 121/4 inches, have been announced by the Redbow Precision Tool Co., 1113 West Lawn Ave., Racine, Wis. Available in five

CAMS

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

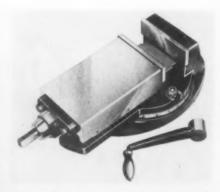
Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC. Long Island City 1, N 23-16 44th Road

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1615 BOUGLAS AVENUE KALAMAZOO, MICHIGAN 5.2 us at Booth 1311, National Metal Exposition, Nov. 4-8 For more data circle 594 on Reader Service Card



HYLO Two Speed Precision Machine Vise

sizes, with open jaw capacities ranging from 2 to 121/4, all HYLO models feature a compact differential feed mechanism that permits an increase in gripping torque without sacrificing speed of traverse. An unusual feature of the 6, 8 and 12 inch models is open jaw capacity equal to the width of the jaws. Utilizing two threads of different pitch on the same shaft, a single revolution of the drop forged handle will open or close the hardened jaws at the HI speed traverse rate of ½ inch per revolution. LO speed traverse rate of only 1/10 inch per revolution is automatically and instantaneously engaged when the jaws contact the workpiece. This immediate shift to a finer pitch affords an increase in leverage at the handle.

For more data circle 148 on Reader Service Card



For more data circle 595 on Reader Service Card

Request Catalog Y-23. Write THE SENTRY CO., FOXBORO, MASS.

For more data circle 592 on Reader Service Card

October, 1957

modern machine shop

HIGH SPEED PRECISION LATHE

Correct Size - High Speed - Precision Results



Collet Work - The right machine for collet work of 1-1/16" or less diameter.



Step Chuck Work - For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



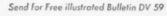
Jaw Chuck Work-Integral mount, universal or independent, for extra accuracy. Capacity to 5".



The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 3500 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease

of operation assure precision results .





HARDINGE BROTHERS, INC., ELMIRA. PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette Street, New York 12, N. Y. For more data circle 596 on Reader Service Card

17" Center Distance Infinitely Variable Speed 230-3500 r.p.m.

5 .. us at Booth 1311, National Metal Exposition, Nov. 4-8 For more data circle 594 on Reader Service Card modern machine shop

738-S1 Broadway, New York 3, N. Y.

For more data circle 595 on Reader Service Card

October 1057

new shop equipment . . .

RETAINER PLATES FOR PUNCHES AND DIE BUTTONS

Special retainer plates for close mounting of interchangeable punches and die buttons are now available from Acme Industrial Products, Inc., P. O. Box 468, Royal Oak, Mich. These retainer plates incorporate a

Acme Industrial Special Retainer Plate

ball lock feature for quick insertion

and release of each punch or die but-

ton. They can be mounted on stand-

New 1957 Model "SS" RADIUS DRESSER

Low Price \$124.50 with Diamond

320 Virginia St.

OUTPERFORMS THEM ALL Cut production time with out sacrificing accuracyl Easy to set, easy to see, eliminates necessity of guard removal. Somerset Radius Dresser turns "tricky" jobs into routine operations.

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ard dies for operation in presses or press brakes, or can be incorporated in progressive die designs. They also Hillside, N. J. enable use of one die for production of more than one part. When certain holes are not desired, corresponding punches are simply removed in a matter of seconds.

For more data circle 149 on Reader Service Card



IMPROVED GRINDING FIXTURE FOR PERFORATOR GRINDING

Harig Manufacturing Corp., 5765 W. Howard St., Chicago, Ill., has an-





· No dial indicator needed · No master required Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP. Columbus 3, Ohio

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BARKER ENGINEERING CO.

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500 Green Rd.

Cleveland 21, Ohio

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For more data circle 596 on Reader Service Card

October, 1957

modern machine shop 325



Switch to Mattison surface grinder doubles output ... consistent accuracy speeds assembly

Not only is output doubled, but improved accuracy being achieved on this Mattison high-powered precision surface grinder enables rotors for high vacuum pumps to be assembled more rapidly. Production now is 50 parts per hour compared to 12 to 25 per hour with former grinding method.

Stock removal on this job is .0015 inch with a high degree of accuracy required. Both parallelism and flatness are held to .0003 inch to assure consistent pump performance at very low pressures.

Greater accuracies also are being realized in machining a wide variety of other scientific apparatus parts. Very thin vanes for another vacuum pump, previously ground one at a time, are now ground in production lots. Reproduceability is greatly improved.

Like every Mattison grinder, this horizontal spindle unit features high horsepower and rigid construction—the design combination that means ability to handle a wide range of work with unmatched accuracy at high production rates.



High-Powered Precision Surface Grinders TTISON MACHINE WORKS Rockford, Illinois, U.S.A.



For more data circle 600 on Reader Service Card

Columbus 3, Ohio

326 modern machine shop October, 1957

For more data circle 599 on Reader Service Card

new shop equipment . . .



Improved Grind-All Fixture and storage case

nounced an improved GRIND-ALL Fixture which is said to allow for the easy grinding of irregular shaped perforators concentric with shank within plus or minus 0.0002 inch accuracy. It can also be used for light milling and boring, radius dressing and as an inspection tool. Features of the improved

GRIND-ALL Fixture include a hand crank for easy rotation of index plate. simplifying all grinding operations especially those requiring continuous revolution; single locking screw that adjusts B-Block to any desired position; and handy leatherette carrying and storage case.

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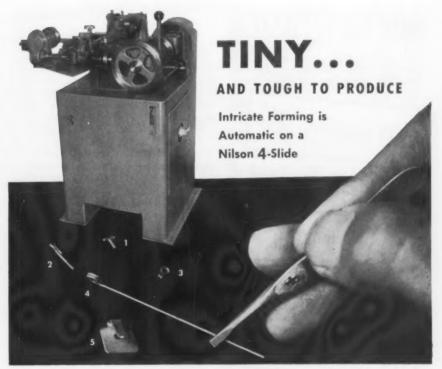
HORIZONTAL BORING, DRILLING AND MILLING MACHINE

The Portage Machine Co., 1041 Sweitzer Ave., Akron 11, Ohio, has announced the addition to its present line of a 36,000 pound 5 inch diameter spindle, horizontal boring, drilling and milling machine which has been designated as the No. 5. The machine is available with vertical head travel of 48 inches and cross travel of table on the saddle of 60 inches. Table



SPARTAN SAW WORKS, INC.

SPRINGFIELD, MASS.



Small wire and ribbon metal forms shown here in actual size are typical examples of modern precision production on a Nilson #00 4-Slide. Compact in size, this 4-Slide produces up to 375 pieces per minute in material not exceeding .040 dia. and 3" in blank length. Easily access to tooling, accurate feeding to within .003, and rugged construction assures years of precision forming.

- 1 Mercury Switch Part014" x .019" platinum wire, formed with tolerances within .001" on over-all length. Production rate, 175 per minute.
- 2 Electrical Contact0076" x .0030" wide phosphor bronze formed at a production rate of 200 per minute.

- 3 Swivel Part....025" brass wire. Heading operation includes eye formed with tolerances within .008", shank within .003 tolerance. Production rate, 300 per minute.
- 4 Leadwire026" soft tinned copper wire formed at a rate of 140 per minute with two 7/64" diameter windings.
- 5 Contact Part010" x 3%" wide phosphor bronze formed at 175 per minute.





1514 BRIDGEPORT AVE., SHELTON, CONNECTICUT

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightoning Equipment • Slide Foods for Presses • Wire and Ribbon Stock Forming Machines

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NOs for

Our Laminum Shims are good news for thousands of metal working plants, because our "NOs" save time and reduce costs.



AMINATED SHIMS OF



STAINLESS						
with laminations						
of .002" or .003"						

LOW CARBON STEEL with laminations of .002" or .003"

BRASS with laminations of .002" or .003"

ALUMINUM with laminations of .003" only

LAMINATED SHIM COMPANY, INC.

Shim headquarters since 1913

3310 Union Street, Glenbrook, Conn.

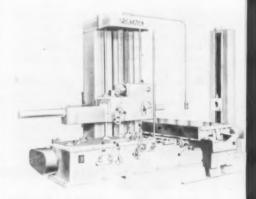
For more data circle 603 on Reader Service Card modern machine shop

new shop equipment . . .

working surface is 36 by 72 inches. Total number of speeds available is 34. Speeds range from 7 to 1,000 r.p.m. Longitudinal travel of the saddle with tailstock mounted is 52 inches. Maximum distance of the spindle sleeves to the tail block is 90 inches.

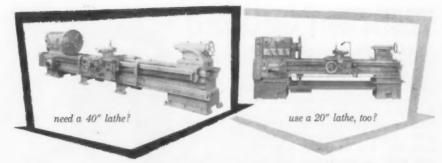
Optional ranges and sizes include 36, 60 and 72 inch vertical head travel and table working surfaces from 48 by 72 to 48 by 96 inches. Longitudinal saddle travel is up to 100 inches maximum. Optional maximum distance of the spindle sleeve to the tail block is 138 inches.

A newly designed headstock has an independent motor driven oil pump that insures a constant flow of oil to the bearings and gears. Included in the new pump arrangement is a fan that forces a flow of air through the headstock over ventilating ribs to dissipate heat from the spindle sleeve bearing. A heavier base, column, saddle and head are ribbed for maximum rigidity. Rigid construction and generous bearing surfaces assure precision throughout the machine range.

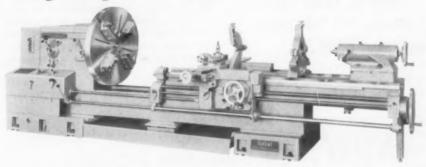


Portage Machine bores, drills and mills

October, 1957



Why buy 2? One Nebel will do!



Save money on initial investment ... with the Nebel extension bed gap, the one lathe that does the work of two ... occupies the floor space of one machine ... requires just one investment.

Make money with the Nebel extension bed gap lathe. Because it offers adjustable swing and center distance capacity, it can be the most useful and the most frequently used lathe in your plant. Use it as a gap lathe—as a standard lathe—and even as a vertical boring mill. Check Nebel extension bed gap lathes. Made in three sizes: AG 20"/40" medium duty, G 28"/50" heavy duty and XB 20"/40" heavy duty. Or Nebel removable block gap lathes; made in 16"/27", 20"/30" and 25"/40" sizes. Write for free descriptive bulletins. Nebel Machine Tool Corp., 340" A Central Parkway, Cincinnati 25, Ohio.

Room to spare: 32" diameter, 4500-lb pump rotor swings easily in the wide, deep gap of the Nebel series AG 20"/40" extension bed gap lathe.



For more data circle 604 on Reader Service Card

new shop equipment . . .

330

Attachments and accessories include precision measuring devices (jig bore attachments) for head and table movement. Precision verniers, angular milling attachment, facing heads, auxiliary tables, rotary tables and angle plates represent a portion of the machine attachments and accessories available. The company will design and build all equipment and tooling to adapt the machine to customer's needs.

For more data circle 151 on Reader Service Card



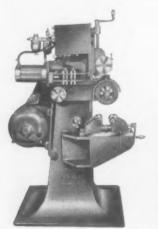
Sunnen PG-800 Precision Utility Gage

St. Louis 17, Mo., is claimed to represent a new method of precision measuring internal diameters. This portable comparator type gage is entirely mechanical. It covers an unusually wide size range from $\frac{3}{8}$ to $\frac{11}{2}$ inch diameter and has a reading scale of 0.005 inch, calibrated and 50 mil-

PRECISION GAGE

The Sunnen PG-800 Precision Gage, recently introduced by Sunnen Service Corp., 7924-G Manchester Ave.,

NOW! CUT UP TO 1,000 PIECES OF PIPE PER HOUR . . .



CONTINENTAL CUT-OFF MACHINES

Cut Pipes and Tubes faster with Continental High Speed Cut-Off Machines. Lowest maintenance means less cost to you. %" to 12 %" O.D. capacities, hand or automatic air-operated bench and floor models. Request free catalog.



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NOW BETTER GROUND FINISHES!

with J&S guaranteed* self-adjusting



SIMPLE DESIGN:

size body.

Only six parts. One-piece main body serves as cup for roller bearing on which spindle turns. Allows much greater capacity bearing in same

AUTOMATICALLY ADJUSTS FOR WEAR:

End thrust from work keeps tapered roller bearing perfectly seated—bearing cone and inner race of ball bearing are pressed on spindle; outer race is a light press fit into main body.

ABSOLUTE CONCENTRICITY AND ALIGNMENT FOR BEARINGS:

Both conical and cylindrical bores of body are ground at same setting in work head. Point is ground under load in its own bearings to insure running dead true.

MORSE	JARNO	B & S	NORTON	LANDIS
2 to 7	6 to 20	7 to 18	10 to 24	.8125 1.3350
			10.02	1.7500

FOR INFORMATION

See your industrial distributor or write for free literature.



JAW CLAMPS . PRICISION WISES . DOWN-HOLDING DEVICES

CLAMPCUT

J A S TOOL CO., INC.

871 DORSA AVE. LIVINGSTON, NEW JERSEY

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332

new shop equipment . . .

lionths graduations. Accuracy is within 20 millionths of an inch. Magnification is 1000:1. The scale is linear over the full range. The gage can be set quickly and accurately to any desired size, is instant reading and repeats consistently. A movable faceplate allows full exploration of holes

up to 3-5/16 inch maximum depth.

Rugged and compact, the gage is easily carried and entirely self-contained, requiring no air or electric connectors. It is a practical utility gage for everyday use in the production shop and in the inspection department, for accurate measurement of internal diameters, especially for checking out of round, taper, barrel or bellmouth.

For more data circle 152 on Reader Service Card





when tools or equipment become magnetised Power consumtion is only 60 watts.

ELISHA PENNIMAN Elmwood 10, Connecticut.

For more data circle 607 on Reader Service Card



HIGH SPEED STEEL

4 FLUTES

Cuts 1/2" to 1". Furnished with 60, 82 or 90 degree included angle. Specify desired degree of angle. Large stocks on hand.

Jobbers' Inquiries Invited KEO CUTTERS, INC.

25040 Easy Street, P.O. Box, Roseville, Mich.

For more data circle 608 on Reader Service Card

STEEL STAND FOR GRANITE SURFACE PLATES

New designs of steel stands have been developed by Collins Microflat Co., 3249 West El Segundo Blvd., Hawthorne, Calif., to accommodate black granite surface plates. The stands range in size from 12 by 18 inches to as large as 10 by 20 feet. They are rigidly constructed of heavy gauge angle iron and are reinforced to withstand from three to six times the weight of the respective surface plates. Overall working height of the stands is 36 inches, but can be made at varying heights as specified. Casters or leveling screws can be furnished according to the user's needs.

A new type paint, described as Metaltone hammer finish, is now being used on these stands. This Metaltone finish is composed of one of fine grade.

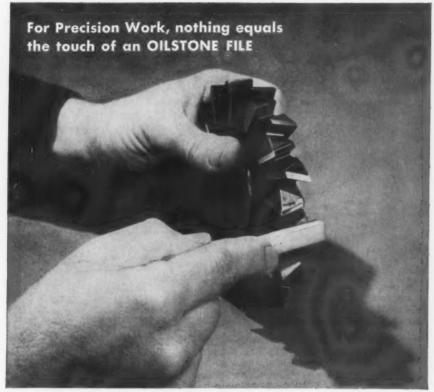
ABRASIVE CENT-R-LAP TOOL



Saves time, eliminates diamond dressing. Cones changed in seconds. Available in three sizes: $\frac{3}{6}$, $\frac{3}{4}$ and $\frac{11}{2}$. Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices. Sold to consumers only.

J. R. REICH MANUFACTURING CO. 201 E. Stroop Rd. Dayton 9, Ohio

For more data circle 609 on Reader Service Card



Hand stoning cutting tools pay off in better cutting speed and longer tool life. Millers, lathe bits, drills and other cutting tools all can be made to give superior performance with an INDIA (for regular work) or HARD ARKANSAS (for superfine finishes) oilstone file.

Over 35 different shapes and 97 sizes are available to help you reach just about any surface that needs sharpening, deburring, etc. The Hand Stoning Handbook gives full details. Write for your free copy today. Address Behr-Manning Co., Troy, N. Y. Dept. MM-10.



A DIVISION OF NORTON COMPANY NORTON

PRODUCTS: • Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes NORTON PRODUCTS: Abrasives . Grinding Wheels . Grinding Machines . Refractories For more data circle 610 on Reader Service Card

October, 1957

modern machine shop

335

"DO IT YOURSELF" Saves Hours, Cuts Costs



HEAT TREAT SMALL PARTS, TOOLS, DIES, ETC. IN YOUR OWN SHOP WITH A VERSATILE, HIGHLY EFFICIENT TEMCO ELECTRIC FURNACE.

Why tie up your big equipment on small heat treat jobs below its capacity, or why "farm out" heat treating of parts, tools, dies? Put a TEMCO bench-type electric furnace in your shop and see how it pays for itself over and over again—in timesavings, cost savings, and production conveniences. Shown above is Type 1700 furnace with Type 400-A Control Cabinet featuring the fully automatic AMPLITROL controller in this convenient mounting.

Temco Furnaces are economical to own and operate . . . easy to hook up . . . easy to use. Eighteen models with chamber sizes from 4" x $3\frac{3}{4}$ " x $4\frac{1}{4}$ " to 10" x $9\frac{1}{2}$ " x 22". \$65 to \$983.25 complete with controls. Write for data and nearest dealer's name.



ELECTRIC FURNACES

Thermo Electric Manufacturing Co.
488 Huff St., Dubuque, Iowa

For more data circle 611 on Reader Service Card

new shop equipment . . .



Collins Steel Stand for surface plates

highly cooked alkyd resin, thus resulting in a rich, lustrous, decorative appearance. Metaltone has unusual corrosion resistance and, upon extended exposure, will retain its rich, sparkling luster.

For more data circle 153 on Reader Service Card



SPIRAL FLUTED TAPS

Making possible a broader range of application for spiral fluted taps and eliminating problems heretofore encountered in their usage, recent additions have been made to its line by Sossner Tap and Tool Corp., 29 Broadway, Lynbrook, L. I., N. Y. Two distinctive styles of two flute spirals in machine screw sizes and in \(^1/_4\) and \(^5/16\) inch fraction sizes are available, as are three flute spirals in \(^1/_4\) and \(^5/16\) inch fraction sizes for applications such as ferrous metals, where extra strength is desired.

Affording unusually free-cutting action—due to a combination of narrow land, wide flute, hooked cutting face



View showing Sossner Spiral Fluted Tap

OSBORN BRUSHING METHODS worthy of your confidence

Solving an inside job



 Removing burrs and metallic particles from threads inside this valve body was once a tedious, time-consuming hand operation.

Today, using Osborn Situft® Brushes and a simple power brushing setup, the four threaded ports in this valve are debutred and cleaned in one operation saving eight manhours per 1000 parts.

This and hundreds of other metal cleaning and finishing improvements made possible by power brushing are the reasons why Osborn has earned industry's confidence. An Osborn Brushing Analysis, made at no obligation, will show how you can make substantial savings on many types of production with Osborn Power Brushing. Write The Oiburn Manufacturing Company, Dept B-8, 5401 Hamilton Avenue, Cleveland 14, Obio.



Power brushing cleans these four threaded holes 66% faster than previous method.



Visit our Booth #1330 NATIONAL METAL EXPOSITION International Amphitheatre Chicago • November 4-8, 1957 Osborn Brushes

For more data circle 612 on Reader Service Card

new shop equipment . . .

and chip breaker effect — there is a unique "doubled scoop" design in the ½ and 5/16 inch sizes. According to the manufacturer, experience has shown this style delivers outstanding results in difficult applications—deep blind holes, for example — and in clinging materials such as copper. For more data circle 154 on Reader Service Card

* * *

GUIDE PINS ARE SUPER FINISHED

Super finishing, long a prerequisite in the automotive aircraft industries for precision bearing surfaces, is now a standard on the guide pins, manufactured by Superior Steel Products



View of Superior Super Finished Guide Pin

Corp., 2754 South 19th St., Milwaukee, Wis. With Super Finished Guide Pins it is claimed that ideal clearances can be maintained due to greater bearing surface.

The process removes the soft outer skin (approximately 0.0002 to 0.003) caused by heat induced as a result of grinding. Super Finishing is also claimed to eliminate charging, which is common to pins lapped with an abrasive compound.

A high luster microfinish (2 to 5 micro inches) results in maximum surface hardness, increased bearing surface, long pin and bushing life.

For more data circle 155 on Reader Service Card



3.0

BEVERLY SHEAR MANUFACTURING CO.

For more data circle 613 on Reader Service Card

sheet and complete details.

Now ..

THE MOST RUGGED

And Most Accurate HEIGHT GAGE MADE!

Delicacy or fragileness no longer need be associated with accuracy!

The new PROTECTOR Gage Tip* provides complete protection against BLOWS FROM ALL DIRECTIONS — even head-on — and the Cleveland INDI-AC Electronic Height Gage still remains accurate to MILLIONTHS of an inch.

An accidental blow, due to handling, or mistake in setup, merely deflects the Gage Tip instead of transmitting the blow and damaging the gaging elements.

Only available on new Cleveland INDI-AC Electronic Height Gages—or as a replacement for standard tips on INDI-AC'S now in service.

*Patent Applied For.

Write for complete details . . .

Cleveland INSTRUMENT COMPANY

735 Carnegie Avenue

Cleveland 15, Ohio

For more data circle 614 on Reader Service Card



kipp

AIR GRINDERS



The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.



MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U.S.A. For more data circle 615 on Reader Service Card new shop equipment . . .

OPTICAL CIRCULAR TABLE

Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill., is now marketing the Matrix 18 Inch Optical Circular Table. This improved model is equipped with a 2 inch diameter illuminated screen, protected by armour plate glass, on which direct readings to three seconds of arc are clearly visible. The projection is accomplished by a system of lenses from a large diameter glass circle graduated in 10 minute intervals. This glass circle built within the table is supported in a specially designed mounting that prevents movement arising from temperature change or shock.

The entire optical system is sealed against dust or oil and insulated from heat radiated by the projection lamp. Smooth and uniform rotation of the table and minimum backlash are obtained through a precision worm wheel drive

For more data circle 156 on Reader Service Card



Matrix 18 Inch Optical Circular Table

It took KENNAMETAL* Tooling—plus KENNAMETAL Tool Engineering Service—to get these results!

There's nothing much that words can add so the story told by the comparative cost figures above. On sixteen separate applications, Kennametal tool cost per hour (center column) totaled \$2.9154—less than one-fourth as much as the \$12.8250 cost for tools previously used (right hand column).

On this basis, the Kennametal tool cost of \$17,490 per year cut previous expense by \$59,460!

It takes a combination of quality

tools and scientific service to produce results like this. Kennametal has built its business upon this combination.

A Kennametal Tool Engineer will work with your personnel, in analyzing various machining jobs to get the best results on each operation. The extensive selection of standard Kennametal tooling usually provides the exact tool needed to handle the work . if not, he can make the proper recommendations.

When desirable, in-plant training courses can be conducted by Kennametal representatives to help your personnel in the selection, application and care of tools to get the most from your tool dollars.

We will be glad to give you full information on how Kennametal tools and Kennametal service can help you. Just write, outlining your particular problem, to KENNAMETAL INC., Latrobe, Pennsylvania.

MINING, METAL AND WOODWORKING TOOLS

WEAR AND HEAT-RESISTANT PARTS





For more data circle 616 on Reader Service Card



Fliminate Waste ... install

WORK-LEVEL II I IIMINATION

with

Soft comfortable light ... instantly adjustable.

No matter how modern your bay lighting . . . operators' arms and heads cause shadows at the vital work level. Eliminate shadows ... and you eliminate eve strain, inaccuracies and fatigue!

Vimcolights are available with many variations to meet your needs best.

- . Machine users write for "Bulletin 85"
- · Machine builders write for "OEM Bulletin'

Vimcolights are (III) listed



VIMCO MFG. CO., INC.

Since 1919

111 BRAYTON STREET . BUFFALO, N. Y. For more data circle 617 on Reader Service Card

new shop equipment . . .

TAP EXTENSION SOLVES AWKWARD SPOT TAPPING PROBLEMS

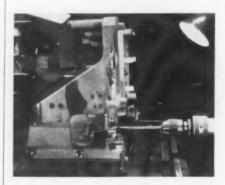
The Ritmar Corp., 183 New York Ave., Huntington, L. I., N. Y., is now marketing a tap extension which has been designed to considerably reduce the amount of time and labor needed for jobs where hard to get at tapping spots can slow down production and, thereby, increase to a great extent the cost of production.

The extension is made so that dull or broken taps can be changed by hand without the use of wrenches, pliers or other hand tools.

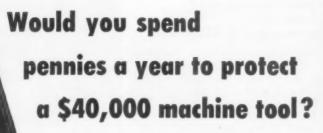
This tap extension is available in a standard length of 9 inches or, for special applications, the extension can be furnished in extra lengths up to 36 inches and with special shanks adaptable to individual tapping equipment.

A tap extension set, containing nine different sizes of extensions to accommodate 15 different sizes of standard taps, is also available from the manufacturer, if desired.

For more data circle 157 on Reader Service Card



Remote blind hole tapping operations are simplified with the Ritmar Tap Extension



C/R Way Wipers prevent

scoring and abrasion of machine tool ways!

A 36-inch vertical milling machine, for instance, costs more than \$40,000. The cost of protecting ways with C/R Sirvene (synthetic rubber) Way Wipers can be measured in pennies per year. In addition, C/R Way Wipers pay for themselves many times over by eliminating downtime and reducing costly master-mechanic maintenance. Precision molded for accurate fit, they wipe ways clean of dirt, chips, fine abrasives, even water emulsions. They fit flat ways, side rails, angles, columns and hydraulic rams. C/R Way Wipers are available in four types for all applications.

Write for this detailed. illustrated brochure on C/R Sirvene Way Wipers.

SIRVENE R DIVISION CHICAGO RAWHIDE

CHICAGO RAWHIDE MFG. CO.

1233 Elston Avenue, Chicago 22, Illinois

Offices in 55 principal cities. See your telephone book. In Canada: Manufactured and distributed by Chicago Rawhide Mfg. Co. of Canada, Itd., Hamilton, Ontario Export Sales: Geon International Corp., Great Neck, New York

For more data circle 618 on Reader Service Card

new shop equipment . . .

SPLINING ATTACHMENT FOR KEYSEATER IS JIG BORED FOR ACCURACY

Announced by The D. C. Morrison Co., P. O. Box 1017-B, Cincinnati 1, Ohio, is a splining attachment for the Morrison 1 inch Keyseater which is jig bored for extreme accuracy.

The attachment consists of a master jig bored plate, taper pinned in two places and bolted to the table top. The work is held in a rotary fixture which, with its plunger, indexes any number of splines or keyways.

The attachment can be stored and then relocated, accurately on the machine by the use of the two taper pins. Hardened steel rollers back up the cutter bar both above and below the



Splining attachment for Morrison Keyseater

cut, thus eliminating any taper in the work.

On the upstroke the table backs away 0.040 inch, thereby giving complete relief to the cutter.

For more data circle 158 on Reader Service Card





Send for new 24 page catalogue

Greater production and increased profits thru 1, 2 and 3 slide control hydraulic tracers and numerical controls.

TRUE-TRACE SALES CORP. EL MONTE 23. CALIF.

For more data circle 620 on Reader Service Card

BRUSH TOP CANS For Layout Blue!



HANDY, ELLISCO BRUSH TOP CANS MAKE IT EASIER FOR YOU TO APPLY AND STORE LAYOUT BLUE, BRUSH KEEPS MOIST IN CAN, CONTENTS WON'T DRY OUT 3 02. TO 1 OT. CAPACITIES, GET DETAILS AND BULLETIN NO. 60A.

George D. Ellis & Sons, Inc. 4024 N. American St., Philadelphia 40, Pa.

For more data circle 621 on Reader Service Card

SPRING LOADED LIVE CENTER-



Eliminate excessive overhang of your center. Use the accurate, rugged, re-liable *NIROL. The spring loaded Live Center that compensates for expansion and contraction in actual operation.

> Write for complete information.

*Reg. U.S. Pat. Off



COMPANY H'WAY 22. N. PLAINFIELD, N. J.

For more data circle 622 on Reader Service Card

Fast and Safe



This LOWELL Reversible Ratchet Wrench

· speeds setup time

· keeps hands from moving parts

An exclusive and popular feature of the Series 20 Lowell Gear Wrench is the reversing knob at the end of the handle.

Machine tool builders find it especially useful for working in dangerous or inconvenient parts of the machine where the hands can't safely reach. And its great strength—the crushing action is on the pawls, not on a pin or screw-makes it a dependable wrench on any job.

In the photo above, a Series 20 wrench is shown as original equipment on the Norton Hyprolap lapping machine. Besides its important functional use, this Lowell Wrench is favored for its neat and modern appearance.

Gear sizes range from ¼" to 2¾", square or hex, and handles from 7" to 36" in length.

Write for Illustrated Details

LOWELL WRENCH CO.

Dept. M-75

Worcester 8, Mass.

For more data circle 623 on Reader Service Card

modern machine shop 345

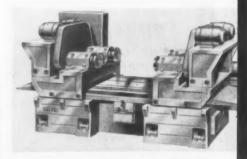
new shop equipment . . .

BORING MACHINES

Two standard precision boring machines, considerably larger than its other standard models, have been introduced by Ex-Cell-O Corp., Detroit



For more data circle 624 on Reader Service Card



Ex-Cell-O Style 2440 Boring Machine

32, Mich. One is a double end machine and the other is single end. Both have been designed for such operations as precision boring, turning, facing, grooving and chamfering, and these operations can be performed singly or in combination.

These models are said to have all of the features of the smaller machines that contribute to accuracy and high production. In addition, they have the extra power, size and rigidity necessary for machining large and bulky parts or for simultaneous operations on a number of parts. A simple control system that is easy to set up and operate, together with a selection of standard spindles and drives, makes these machines versatile.

The double end model, Style 2440, has two bridges that support the spin-

MILWAUKEE Precision EQUIPMENT

Designed and finished to assure true dimensional accuracy.

Made from highest grade semi-steel.

WRITE for Catalog and Latest Prices

No. 310

No. 200

J. C. BUSCH COMPANY

126 E. Pittsburgh Ave., Milwaukee 4, Wis.

SURFACE PLATES ANGLES • PARALLELS STRAIGHT EDGES

No. 200

Of Service

For more data circle 625 on Reader Service Card

12/4/2(CO 2000 on 6(3) 13

WATERLESS DEGREASING

Request Newest Data on SAFE Care of all Machinery, Motors, Tools, Dies, Fixtures, Etc. • Approved by Underwriters' Labs, Inc.



BARCO Chemical Products Co.

701 S. LaSaile St. Chicago 5, Illinois

For more data circle 626 on Reader Service Card



NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles.

Write for Bulletin.

BYCO INDUSTRIES

2200 Snelling Ave.

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Minneapolis 4, Minn.

For more data circle 627 on Reader Service Card

HIGH SPEED

FLAT TWISTED AND ROLLED SECTION

DRILLS

Unexcelled in Quality and Performance since 1903!

HI-DUTY Flat-Twisted and Rolled Section Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the dain of the steel. Sizes range from $\frac{1}{2}$ 4" and larger. Milled type drills are also available—from $\frac{1}{6}$ 4" to $\frac{1}{2}$ 2" diameter. Hi-Duty means long lasting economical service!

SPECIAL DRILLS

We manufacture a large variety of special types of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY ...

We can make immediate shipment from stock on many special drills! Contact your Industrial Supplier or write today for Catalog and Price List.

HI-DUTY DRILL WORKS

FLEETWOOD, PENNSYLVANIA

For more data circle 628 on Reader Service Card



INDUSTRIAL

EQUIPMENT

BURNERS & FURNACES (Heat Treating, Melting, Soldering)

NO BLOWER OR OTHER POWER NEEDED

. . . just connect to gas supply!

Outstanding service since 1911! Each unit, with the famous "BUZZER" Venturi, delivers the hottest, quickest heat attainable without a blower. Full range control of heat and turn-down. Standards or specials available for manufactured, natural or liquefied gas applications.







Write for New "BUZZER" Catalog.

Atmospheric Pot Furnaces

CHARLES A. HONES, INC.

141 S. Grand Avenue, Baldwin, L. I., New York

BAldwin 3-1110

For more data circle 629 on Reader Service Card

new shop equipment . . .

346

dles and their drive equipment. The bridges are 54 inches wide to allow for mounting a number of spindles. Also, bridges can be spread apart to accommodate large workpieces and moved close together for fast operating cycles on smaller parts. The maximum

length of stroke of the table is 40 inches, and table fixture pad dimensions are 28 by 46 inches.

The single end model, Style 1440, is identical to the Style 2440 except that it is supplied with only one bridge, which is mounted on the left hand end of the machine.

For more data circle 159 on Reader Service Card







Ask for Descriptive Circular

MUMMERT-DIXON CO.
120 Philadelphia St. Hanover, Pa.

For more data circle 630 on Reader Service Card

ORIENTOR ALTERNATES PARTS FOR BACK TO BACK MACHINING

An automatic orientor for feeding parts into a hobber, properly positioned for back to back hobbing, has been added to the line of automated loading and unloading devices developed and built by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. The unit is particularly applicable to gears with extended hubs and similar parts which tend to support each other when mounted in pairs on an arbor. Although designed primarily for Michigan Hobbers, the unit can be used to load other types of machine tools.

By use of this parts loading method, output of a single spindle hobber can be practically doubled. Hob life for a given production run is said to be extended substantially by back to back hobbing, as the hob enters the cut only once instead of twice.



VERTICAL

At last, a top quality industrial sander that provides all the most wanted features - yet sells for so little. \$9.95 complete with cord, plug, switch ready to use

Illustrated Literature on Request A few desirable distributor territories still available.

WALLS SALES CORPORATION 333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 631 on Reader Service Card



JACO DEVICES, INC.
98 High St., Hingham, Mass.

For more data circle 632 on Reader Service Card

October, 1957

57



High Precision

COMPAC

Bore Gage SWISS MADE

- Four Gages to cover range from .270" to 12"
- .0001" Graduation
- Carbide tipped
- Adjustable depth stop
 Shock resistant indicator

Sales, parts and Service:

BOREL & DUNNER

19313 FARMINGTON ROAD

MICHIGAN

For more data circle 633 on Reader Service Card



MARK OF QUALITY

S T A N D A R D



• The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO. BEAVER PALLS PENNSYLVANIA

Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 634 on Reader Service Card

October, 1957

What is your (1) LUBRICATING PROBLEM?

- LATHE CENTER LUBRICATION SCORING-GALLING
 - GRINDING CENTERS
 LUBRICANT WASHOUT
 - DRAWING SCORE MARKS-DIE WEAR
 - STEADY RESTS
 WORK PIECE DAMAGE





CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

> CHECK AND SEND IN FOR SAMPLE

Anti-Scoring Lubricant chicago manufacturing and distributing co.

1910 West 46th Street, Chicago 9, Illinois For more data circle 635 on Reader Service Card

modern machine shop

349

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For more data circle 631 on Reader Service Card For more data circle 632 on Reader Service Card

modern machine shop

October, 1957



For more data circle 636 on Reader Service Card



THE TWO IN ONE

COMBINATION ROTARY TABLE AND

ANGLE PLATE

PRECISION **ACCURACY**

WORM adjustable from 0 to 90 degrees.

VERNIER control to within

WRITE FOR FOLDER 2 seconds of Arc.

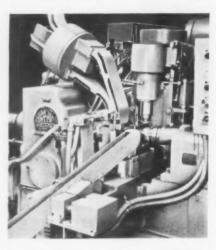
Makers of Helical Gear Speed Reducers. Worm and Gear Speed Reducers. Standard and Special Gears. Wedge-Lock Turret for Lathes and Turret Lathes. Open territory available to representatives

OLSON INDUSTRIAL PRODUCTS, INC. 40 W WATER ST

For more data circle 637 on Reader Service Card

modern machine shop

new shop equipment . . .



Michigan Automatic Orientor installed on the Model 1445 Hobbing Machine

In operation, all parts enter the drum type alternator aligned the same wav.

The parts are gravity fed into the drum from an overhead distribution system—a positive stop permitting only two parts to enter the alternator at any one time.

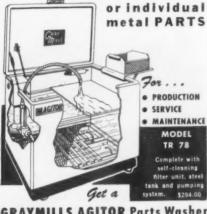
Limit switches, actuated by the machine cycle, move spring loaded pawls which release a swinging arm to rotate one of the two parts through an arc of 180 degrees.

The parts are then in a back to back position, but on opposite sides of the drum. Two escapement mechanisms allow each to slide down its independent track.

The tracks merge at the input end of the machine feed slide where the parts drop into a slot in proper position to be mechanically shuttled to the arbor of the machine.

For more data circle 160 on Reader Service Card

YOU CLEAN DIES



GRAYMILLS AGITOR Parts Washer

- 1. Flush chips and dirt from Metal Parts
- with filtered solvent.

 2. Clean out blind holes and cavities.

 3. Do it thoroughly, fast and safely.

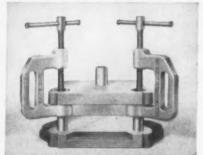
Send for catalog and prices.

147

3769 N. Lincoln Ave. Chicago 13, III. GRAYMILLS CORP.

For more data circle 638 on Reader Service Card

economically priced press room equipment



DURANT Die Set Pullers

Easily removes punch holder from die shoe by a straight upward pull, yet protects the die set. 3 Models fit all sizes of die sets. Priced fram \$18.00 per pair.

WRITE FOR NEW FREE CATALOG

PROVIDENCE 3, RHODE ISLAND

For more data circle 639 on Reader Service Card

October, 1957

Great Buys from

VICTOR

Extra Long, Straight Shank **High Speed Drills**

12" OA. 9" FLUTE

SIZE	PRICE	SIZE	PRICE
1/8 9/64 5/32 11/64 3/16 13/64 17/32 15/64 11/64 19/64 5/16 21/64 11/32 23/64 3/8	1.65 1.75 1.85 1.85 1.95 2.05 2.05 2.15 2.25 2.25 2.50 2.75 2.75 3.05	27/64 7/16 29/64 15/32 31/64 17/32 35/64 9/16 37/64 19/32 39/64 5/8 21/32 11/16 23/32	3.30 3.60 3.60 4.20 4.20 4.75 4.75 5.00 5.40 6.25 6.75

18" OA, 131/2"-14" FLUTE

SIZE	PRICE	SIZE	PRICE
3/16	4.00	9/16	8.75
7/32	4.10	19/32	9.50
1/4	4.10	5/8	10.00
9/32		41/64	11.00
5/16	4.75	21/32	11.00
11/32	5.25	43/64	12.00
3/8	5.25	11/16	12.00
13/32		45/64	13.00
7/16	6.00	23/32	13.00
15/32		47/64	14.00
1/2	7.00	3/4	14.00
27/20	0.50	0/4	84.00

Order Today

IMMEDIATE DELIVERY!

VICTOR

MACHINERY EXCHANGE INC.

Dealers in Tool Room Equipment

251 CENTRE STREET, DEPT. B

Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 640 on Reader Service Card

modern machine shop

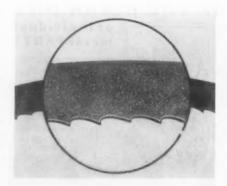
new shop equipment.

HIGH SPEED STEEL BAND SAW BLADE

350

A series of important developments resulting from intensive research have made possible the introduction by The L. S. Starrett Co., Athol, Mass., of a band saw with unusual performance characteristics. These developments include: recent perfection of methods of producing high speed steel in thin strip suitable for band saw stock; new heat treating methods which permit controlled hardness graduating from a super hard cutting edge to a super tough flexible back; and advancements in welding techniques which make possible welding high speed steel saw stock into bands with the weld as strong as the parent metal.

The result is the Starrett Safe-Flex High Speed Steel Band Saw, a con-



ror more data circle 100 on header Service Card

Starrett High Speed Steel Band Saw Blade

tinuous cutting tool of high quality high speed steel with extremely hard teeth for cutting at maximum speeds and feeds, combined with a back that has complete flexibility and extra toughness for safety and long life.

An important characteristic of this high speed steel band is its ability to



For more data circle 641 on Reader Service Card

October, 1957







For more data circle 643 on Reader Service Card

The STEVENS Line SINCE 1925 Introducing NEW series



ROTARY TABLES, 5-71/2-8-12-15-18-24" sizes both standard and dial indexing types ADJUSTABLE TILTING TABLES, #0-1-2 COMPOUND TABLES, #1-2 ROTARY-COMPOUND TABLES, #1-11/2-2 INDEX CENTERS-multiple spindle SPECIAL MACHINES—designed and built See your dealer or write for bulletins

The John B. Stevens Company Main Street, Samersville, Conn., U. S. A.

For more data circle 644 on Reader Service Card



MONEY-BACK TRIAL OFFER

Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic water-soluble paste. Inorganic. Thin before applying and start welding at once. \$3.40 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of subassemblies. \$3.45 per gallon, f.o.b. Dayton.

PROTECT-O-METAL

G. W. SMITH & SONS, INC.

1700 SPAULDING RD., DAYTON 3, OHIO

For more data circle 645 on Reader Service Card

new shop equipment . . .

retain hardness even up to red heat temperatures of 1,100 degrees F. Combined with the high tensile strength and toughness, this permits greater tensioning, heavy feeds and fast speeds for the efficient cutting of the hardest and toughest types of materials.



For more data circle 646 on Reader Service Card

Thicknesses of these bands range from 0.025 to 0.042 inch—a feature that means important material savings in production cut-off work, and greater adaptability to severing gage produced finished work.

These Starrett Safe-Flex High Speed Steel Bands are available in regular, hook tooth and skip tooth types in four widths and a wide variety of pitches. They are recommended for cutting tool and die steels, all ferrous alloys including carbon steels, free machining steels, alloy steels, tool steels, stainless steel, as well as titanium and other hard to cut metals.

For more data circle 161 on Reader Service Card

ECCENTRIC PRESS HAS 24 INCH STROKE

The Cleveland Punch and Shear Works Co., East 40th and St. Clair Ave., Cleveland 14, Ohio, recently announced that its 500 ton four point eccentric press is being used to produce a wide variety of various automotive stampings.

Featuring the patented air operated, electrically controlled drum type clutch, the unit has a 24 inch stroke and 15 inch adjustment. The shut height is 61½ inches. Both the bed and slide have an area of 72 by 144 inches.

According to the manufacturer, the basic design is extremely flexible. By



For more data circle 647 on Reader Service Card



HARGRAVE CLAMPS

Complete Line of Clamps for all Purposes

Individually Power Tested for Better Parformance.



"C", Steel Bar, Quick Acting. Wood Hand Screws, Welders

WRITE FOR FREE CATALOG.

Showing Clamps, Chisels, Punches, Masonry Drills for hand and power hammers, Carbide Drills, Washer Cutters, and File Cleaners.

Stocked by Your Local Distributor. THE CINCINNATI TOOL COMPANY 1947 Waverly Ave., Cincinnati 12, Ohio

For more data circle 649 on Reader Service Card



DO YOU SAVE MONEY with several Accuracy jeopardizing setups when one set-up could do your work?

We think not!

With our WOHLHAUPTER MASTERHEAD IN ONE SET-UP you do boring, facing, recessing, undercutting, turning, etc. on ONE machine and Save considerable time Increase production Increase efficiency Utilize your present machine park more economically. 9 models of the WOHLHAUPTER MASTERHEAD available with capacities up to 311/4

All models have automatic feed and automatic end release. Multiple feed models have 12 slide feeds.

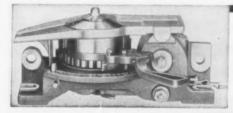
Also Automatic Tapercutting Heads for Angles 0-180°, inside and outside.

Sole U. S. A. Representatives

404 4th Ave., Dept. MMS New York 16, N. Y.

NEIZE MODERNTOOL

For more data circle 650 on Reader Service Card



1200 PIECES

PER HOUR

This piece was made from brass rod and slotted as shown in the print below. Production on this item was 1,200 pieces per hour.

EARBORN **Automatic Chucking** and Indexing Fixture

FEATURES.

- 1. Work held by collets
- 2. Automatic opening and closing
- 3. Work automatically ejected
- 4. Automatic indexing if required
- 5. Three models with capacities from 1/32" to 2".



Write for illustrated data, Send blueprints or specifications of work.



For more data circle 651 on Reader Service Card

new shop equipment . . .

modifying various dimensions such as stroke, slide adjustment, bed and slide areas. Cleveland Four Point Presses are available in an almost unlimited range, thus permitting the stamping of metal of almost any thickness from light sheet to heavy plate.

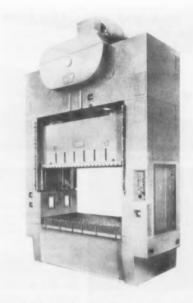
modern machine shop

Built to J.I.C. standards for safe and efficient operation, all gears and the drive mechanism on this press are completely enclosed and the die area is illuminated from both sides by lights recessed in the uprights. This also facilitates quick die changes. An auxi-

liary air brake is provided for bringing the flywheel to a quick, sure stop.

For smooth operation and a minimum of maintenance, all gears are spray lubricated, and the pneumatic cushions in the bed have separate operating controls.

For more data circle 162 on Reader Service Card



Cleveland 500 Ton Four Point Eccentric Press



OU'RE WORRIED OVER SPOILAGE LOSSES

On tapping and reaming jobs, many have found that all they had to do practically to eliminate their spoilage losses was to switch over from ordinary tool holders to Ziegler Floating Holders.

They found that the Ziegler automatically compensated not only for misalignment caused by faulty set-up but also for misalignment resulting from the machine getting out of level because of settling, whether caused by soil formation, or by machine vibration, or both.

Isn't this a simple way to solve your problem of costly spailage losses? Try it and see for yourself!

PROMPT DELIVERY

ZIEGLER TOOL CO.

13566 AUBURN DETROIT 23, MICH.



For more data circle 652 on Reader Service Card



TRUE POINT DRILL SHARPENER

for Drills 41-60 and 61-80 R.H. & L.H.

A properly sharpened drill cuts faster — more accurately and is less likely to break.

Write for circular and full details.

UP-TO-DATE TOOL CO. P. O. Box 99, Station A. Worcester S. Mass.

For more data circle 653 on Reader Service Card

M MILLING G BORING SPECIALIZED CAM MILLING SERVICE. JIG BORING SPOT WELDING CONTRACT PRODUCTION EXPERIMENTAL DEVELOPMENT SEND FOR NEW CATALOG NO. 52-CN ER ENGINEERING CO., INC. 13TH ST., NEWARK 3, N. J.

For more data circle 654 on Reader Service Card

REDUCE Set-up Time and the need for expensive jigs & fixtures

H**ART** MILLING FIXTURES

"Masters of A Thousand Set-ups"

Write for illustrated Folder

Value proved by years of use. WALTER W. FIELD & SON, INC. 39 Hayward St., Cambridge 42, Mass.

For more data circle 655 on Reader Service Card



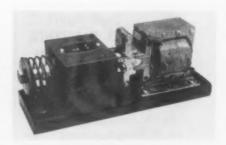
For more data circle 656 on Reader Service Card

new shop equipment . . .

REDESIGNED CONTROL VALVE

John D. Bachman and Co., 1849 Sparger Lane, Bristol, Tenn., has available a complete line of low pressure, direct acting control valves. These valves are satisfactory for air, many gases and fluids up to 200 p.s.i. The valve parts are phenolic laminate and are hard coated aluminum. The plunger is radially serrated and O rings are recessed in the valve body.

The valve body is a dense, hard material produced by subjecting layers of fabric, impregnated with thermosetting resins, to high heat and pressure. Polymerization transforms the layers into an almost homogeneous mass which will not delaminate, even after severe use and which remains unaffected by steam, hot oils, humid atmosphere and many corrosive conditions. Valve bodies are wear and shock resistant, chemically inert, in-



Bachman Solenoid Operated Control Valve

soluble, infusible and unaffected by rapid temperature changes. Valves are subject to 1,000 p.s.i. test pressure.

Pipe ports are perpendicular to the laminations and retain sealing characteristics, even under severe conditions.

The aluminum valve stem is finished by the alumilite method and colored black. This surface will withstand normal wear indefinitely.

Solenoid assemblies are joined on a fibre base with rollpin dowels. Main-



For more data circle 657 on Reader Service Card



WALTER

PRECISION DIVIDING ROTARY TABLES

With & Without Dividing Discs

- . READABILITY: 6 SECONDS. . CONSTRUCTED FOR LONG LIFE.
- . MAINTAIN PRECISION.

 AVAILABLE IN 10", 121/2", 153/4", 193/4", 25", 31". Also many types of Universal Precision Divid-ing Heads and Attachments for most economical production.

Test reports furnished with literature. Sole Agents:

NEISE MODERSTOOLS KARL A. NEISE 404 4th Ave., Dept. MMS, New York 16, N. Y.

For more data circle 658 on Reader Service Card

THE Original METCALF GRINDING WHEEL DRESSER



BALANCED FAST-COOL CUTTING ACTION-HIGH SPEED WHEEL FORMING and CRUSHING

COMPLETE ASSEMBLY\$7.95 EXTRA WHEEL

Made by the World's Largest Manufacturers of SAW SHARPENING and KNIFE GRINDING MACHINERY

HANCHETT MANUFACTURING COMPANY

Main Office Big Rapids, Michigan

West Coast Portland, Oregon

For more data circle 659 on Reader Service Card

PRODUCTION Tripled TOOL COST Halved with W&S **COMBINATION TOOL**

A home appliance manufacturer was using four screw-machine stations for centering, drilling, counterboring and reaming for brass components. To increase output of the machines. Woodruff & Stokes was asked to design a combination tool to center, drill, counterbore and ream in one operation. The resulting tool cost half as much as the four tools it replaced, cut production time by two-thirds, by making double indexing possible.

Chances are, a tool designed by W & S small tool specialists can streamline your own production. Our tool specification sheet makes it easy for you to find out.



Hingham, Massachusetts For more data circle 660 on Reader Service Card

359 modern machine shop

new shop equipment . . .

tenance is thus simplified and assemblies are not subject to change from original alignment.

modern machine shop

The light weight and resilient materials used in Bachman Valves reduce noise and cushion impact. The result is long life and trouble free operation. For more data circle 163 on Reader Service Card



Challenge Three Point Suspension Plate

THREE POINT SUSPENSION SURFACE PLATES

A line of semi-steel three point suspension surface plates for toolrooms and pattern shops in sizes of 30 by 60 inches up to 48 by 96 inches has been announced by The Challenge Machinery Co., Grand Haven, Michigan.

The three point suspension feature eliminates the problem of plate rock-

ing, if the base or stand is placed on an uneven surface. Also, they feature a strongly ribbed construction, eliminating the need for a heavy rigid stand. The plates are available in three types of finishes: planer finish, precision ground and hand scraped, with surface accuracies from 0.002 to 0.0002 inch. For more data circle 164 on Reader Service Card

MOVE THE DRILL . . . INSTEAD OF THE WORK!

Ram travels in and out, rotates around its axis 360°, raises vertically, on the new Johansson Radial Drilling Machine.

Sensitive adjustments make it fast and easy to spot drill accurately over each hole location. Yet machine has rigidity of stationary drill when positive locks are engaged.

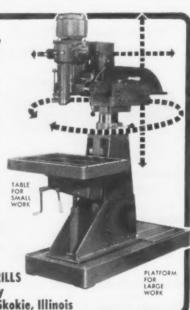
GEAR DRIVE-INSTANT SPEED SELECTION. RUGGED, PRECISION CONSTRUCTION COMPENSED CRECIFICATIONS

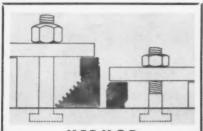
COMPENSED SECULICATIONS -	
Drilling Capacity	13/4"
Spindle Travel	6"
Spindle Speeds (8)105 - 1400	RPM
Center Spindle to Col., Max	26"
Spindle to Work Surface, Max	53"

WRITE NOW FOR ILLUSTRATED FOLDER

RADIAL & UPRIGHT DRILLS I. O. Johansson Company 7248 St. Louis Avenue, Skokie, Illinois

For more data circle 661 on Reader Service Card





MERMOD SET-UP BLOCKS

- Adjustable in steps of 1/25"
- · Rounded teeth fit and mate perfectly
- · Case hardened and tempered steel

ELIMINATE HUNTING FOR PROPER STRAP SUP-PORTS AND REDUCE SET-UP TIME TO A FRACTION

Eliminate inaccuracies and accidents due to improper strapping

WHY NOT INCREASE YOUR PRODUCTION. ACCURACY AND PROFITS?

Sole U.S.A. Representatives:

NEISE MODERNTOOLS

n

KARL A. NEISE 404 4th Ave., Dept. MMS New York 16, N. Y.

For more data circle 662 on Reader Service Card



CAP SCREWS . COUPLING BOLTS SET SCREWS . MILLED STUDS our specialty

YORK, PENNA.

For more data circle 663 on Reader Service Card

October, 1957

PALMGREN

ROTARY AND INDEXING TABLES AND ANGLE VISES

to speed up production on Milling Machines or Drill Presses

USED IN ALL INDUSTRIES . Everywhere

No. 83

Rotary Table. Cross feed slides and rotary Feed, Converts for vertical milling. 8" diameter \$79.95



No. 84

Tilting Rotary Table. Rotary and cross feeds in one unit, 90° angle adjustment. 8° table top \$139.50

No. 86 Rotary and Indexing

Table. Graduated rotary feed. 8" Table diameter \$69.95

No. 96 (not shown), 6' Table diameter, only \$59.95



No. 60B

Machine Vise. 6" jaw width, a precision vise with

swivel base \$99.95 Without base, No. 60 \$89.95 Also 40B. 4' jaw, with swivel base \$79.95

Without base, No. 40 No. 24 B Angle Vise. 4" jaw. Solve difficult Angle jobs on the production line - quick, accurate setups at any angle in such operations as drilling. milling, grinding. Also other jaw sizes: 1½", 2½", 3", 4", 6" and 8". \$39.95

Ask for new catalog No. 205 for complete line, details and prices.

CHICAGO TOOL & ENGINEERING CO. 8399 South Chiroga Ave. Ebiroga 17 Binois

For more data circle 664 on Reader Service Card

modern machine shop



MAD SCRAPER

After the original regrinding most users of this new Anderson hand scraper find that only honing is necessary. Judge for yourself: Order as many Model 5-D scrapers as you want. We'll send them promptly. Use them a full week... if they don't live up to all your expectations, send them back to us for refund.

Faster Cutting
Easier to Use
Just the Right Spring
Palm Fitting Grip
Light in Weight
18" — 20" — 22" lengths

\$6.75... with high speed steel blades

\$9.85... with carbidetipped blades

\$1.75... for rubber bumper shown below

ORDER AS MANY AS YOU NEED MONEY-BACK GUARANTEE

Indicate choice of high-speed steel or carbide-tipped blades, and 18", 20", or 22" lengths. We suggest you include rubber bumpers in your order. Write today for Bulletin No. 10-22.



ANDERSON BROS. MFG. CO. 1807 Kishwaukee St.

1807 Kishwaukee S ROCKFORD ILLINOIS

For more data circle 665 on Reader Service Card

new shop equipment . . .

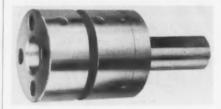
ADJUSTABLE TOOLHOLDER FOR TURRET LATHE WORK

Rockford Engineered Products Co., 2324 Twenty-Third Ave., Rockford, Ill., has announced the development of an adjustable toolholder for turret lathes, engineered to insure true center precision drilling, reaming and tapping operations. The holder has been designed for quick, easy positioning of tools on true center and to compensate for as much as 1/32 inch misalignment. Dead center settings are made by simply adjusting positioning set screws and tightening locking cap screws. The Repco Holder simplifies setups, saves time, helps eliminate tool wear and breakage and serves to reduce scrap losses.

The Repco True Center Adjustable Toolholder is precision built from alloy steel, hardened and ground to prevent nicking and burring. Shank and holder are precision machined concentric within 0.0005 inch. The holder eliminates danger of cocking, prevents bell mouthed, out of round, tapered and oversized holes, and thus provides an economical means of meeting exacting work specifications.

Four standard holders are provided in bore and shank diameters of $\frac{3}{4}$, 1 inch, $\frac{11}{2}$ and $\frac{13}{4}$ inches.

For more data circle 165 on Reader Service Card



Repco True Center Adjustable Toolholder

October, 1957



For more data circle 666 on Reader Service Card

\$31.80

F.O.B. New York



Guaranteed Accuracy Within .001" Reading .001"

- SPEED
- **PRECISION**
- DEPENDABILITY

Full scale readings of 5"-6"-8"-10" available. Also Foot with Scriber to convert to Vernier Height Gage.

Ask for catalog and prices of other Standard Calipers.



KARL A. NEISE 404 4th Ave., Dept. MMS New York 16, N. Y.

For more data circle 667 on Reader Service Card

HIGH COBALT STEEL CUT-OFF TOOLS are STANDARD at Somma

Now plain cut-off and chamfer too's and form tool blanks for B&S and Davenport machines made from T-5 High Cobalt H.S.S. have been added to Somma's long list of standard form tools.

The high cobalt content of T-5 steel provides higher red hardness which assures 3 to 10 times longer tool life and the high vanadium content greatly increases abrasive wear resistance.

Write for complete catalog and name of distributor in your area.



West Coast Warehouse: 576 N. Prairie, Hawthorne, Calif.

For more data circle 668 on Reader Service Card





 Give More Accurate Control of Limits and Finish • Elimination of Chatter and Breakage • Extended Cutter Life • Better Performance
 Increased Production

FREE DATA — 24 page catalog on milling with ABER Cutters.

ABER ENGINEERING WORKS

WATERFORD, WISCONSIN

For more data circle 669 on Reader Service Card

new shop equipment . . .

ABRASIVE BELT GRINDING MACHINE AVAILABLE IN FOUR SIZES

A line of pinch roll belt grinders, capable of providing outstanding surface finishes while grinding titanium, stainless steel or carbon steel flat stock to precise gage thickness in a single pass, has been announced by Mattison Machine Works, Rockford, Ill. Four machine sizes are available, providing capacities of 36, 48, 60 and 72 inches. Feed roll speeds are fully adjustable from one to 100 f.p.m. to meet a wide variety of operating requirements.

Outstanding operating efficiency and minimum belt costs are said to be assured by the design of the belt drive and idling mechanism that provides for belt travel over four rolls designed in a diamond shape. This arrangement, together with the exceptionally long, 20 foot, 3 inch belt, provides improved flexing and chip removal, plus allowing the belt to remain cool and free cutting during long periods of operation.

Belt adjustment is through the top idler roll that can be adjusted vertically for correct tension and cambered for belt alignment. The top idler roll is cambered automatically in order to produce the proper action of the



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS Wilmerding, Pa.

For more data circle 670 on Reader Service Card

October, 1957

BORING

and

Large Precision Machining

Done to your specifications

We have 22 Jig Borers

KIDDE PRECISION TOOL CORP. 15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 671 on Reader Service Card

Accurate Hole Transfer Made Easy With

NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located.



Reduce time and eliminate spoilage of other methods. 8 sizes, from 3," to 3,4" U.S.S. Inexpensive - Last for years.

Write for Circular

NIELSEN TOOL & DIE COMPANY 17360 Lahser Road, room 202 Detroit 19, Michigan

For more data circle 672 on Reader Service Card

Variable Speed Drive—Full Hydraulic Operation 14" x 18" capacity respectively,

Speeds from 60 to 300 f.p.m. Combined with a graduated metering valve on our fully hydraulic models permits choice of proper blade speed and pressure for maximum production and blade life from high speed or high carbon steel blades.

MODELS W and F-9" x 18" and

Send for FREE CATALOG.

feature full hydraulic operation. All welded steel base-more rigid for heavier cutting. Welded one-piece cutting head for swifter blade changes and easier chip removal. Larger capacity coolant and chip tray. Automatic bar feed available to reduce operator's time to a minimum.

Dept. M.

W. F. Wells and Sons

THREE RIVERS MICHIGAN

North on

old U.S. 131 Metal Cutting Band Saws

For more data circle 673 on Reader Service Card



chips oil coolant sludge

FROM MACHINE TOOL SUMPS



AIR OPERATED SUMP CLEANER Model AXO RedTop

- High performance-30-50 GPM suction
- Self-sealing lid weighs 33 pounds
- · Simple to operate—low cost
- Develops vacuum to 275 in. water

Newest, low price model in Carnes line. Seven other models available in 55 to 200 gallon tank sizes, filtering option, wheel choice. Available for air or electrical operation.

Send us your problem

Representatives in major cities

COOLANT EQUIPMENT CORPORATION • Verona 3, Wisconsin

For more data circle 674 on Reader Service Card

production

new shop equipment . . .

belt across the work.

364

This machine has been designed for handling both polishing and stock removal jobs. Where there is no need for holding thickness or parallelism, the billy roll floats against the sheet. But for positive stock removal and holding size, two air controlled dashpots move the billy roll up against positive stops, exactly parallel to the contact roll. Thus, the Model 456 can be used to reduce rolling mill gauge tolerances.

Ability to work in either direction adds materially to the usefulness of the Mattison No. 456 Pinch Roll Grinder. Feed and work roll design are such that material can be fed with the rotation of the belt or against it with equal efficiency.

Quick belt changes reduce machine



Mattison Model 456 Pinch Roll Grinder

downtime. To change belts, tension is relieved by lowering the top idler roll; the connecting plate at the front of the machine is disconnected and swung out of the way so that the old belt is slipped off and a new one put



Results have proved that once this tapper is in your shop or tool-room and you find 70% of your free hand tapping time saved-

it will stay there! The new Allman hand tapper has these advantages:

· Articulate swings clear of large table for placement of work.

· Limitless number and sizes of tapped holes without moving work piece.

• Vise helds work as small as 3/8" square. · Floating tap locates itself in hole.

· Individual spindle holds taps, thus change requires only seconds.



1734 No. 25th Ave. • Melrose Park, III

For more data circle 675 on Reader Service Card



net in a knurled aluminum holder. Send it in after chips and it comes out covered with them.

YOU CAN'T AFFORD to be without it! A natural for your tool box or crib. Made 1/8" to 1/2" sizes, at a price to attract. Write now for circular.

HEIMANN MFG. CO., URBANA, OHIO

For more data circle 676 on Reader Service Card

MAGNETIC SINE PLATES



COMPOUND AND SINGLE ANGLE

> New Dual Field permanen? magnetic chuck: with extra holding power.

Positive lock on each axis.

No. 1905 M

The new Dual Field permanent magnetic chucks, with a center T slot, allow either side to be magnetized independently. All models are accurate to .0002" in dimensions and parallelism. A .2000" recess is provided for small angles.



Wite for catalogue and prices on full line of Bald Eagle Sine Bars and Plates.

For quality—Specify Bald Eagle

Bald Eagle Corporation (Formerly Bald Eagle Tool Co.)

356 Cedar Street . St. Paul 1, Minn.

For more data circle 677 on Reader Service Card

UNIVERSAL DIVIDING HEADS



· Precision built to meet every requirement. Carroll Dividing Heads are the accepted standard in metal-

working plants from coast to coast. • A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.



CARROLL DIVIDING HEAD CO. 3525 Cardiff Ave. Cincinnati Ohio

For more data circle 678 on Reader Service Card

October, 1957



SPITFIRE Tool Machine Co.

2931 N. Pulaski Rd., Chicago 41, 111.

For more data circle 679 on Reader Service Card modern machine shop 367

Bill Jackson came home from the Air Force.

October, 1957



BOYAR-SCHULTZ CORPORATION 2020 South 25th Ave., Dept. F-L, Broadview, III.

BENCH LAP SET

Consists of seven most commonly used sizes - 1/6"-3/16" 1/4" - 5/16" - 3/6" 7/16" - 1/2", with enameled die cast

base.

368

new shop equipment . . .

on. The complete changeover takes only a few minutes.

This grinder combines heavy, wellbraced construction with high horsepower for maximum productivity. Size of the main drive motor ranges from 40 to 150 h.p. depending upon machine size. All operating controls are located at the front of the machine within easy reach of the operator. A load ammeter indicates the amount of grinding load, permitting the operator to determine the point of best work efficiency.

For more data circle 166 on Reader Service Card



SMALL TOGGLE CLAMPS

Detroit Stamping Co., 349 Midland Ave., Detroit 3, Mich., has introduced



For more data circle 681 on Reader Service Card

See Your Industrial Supply Dealer or Write to

DREMEL MANUFACTURING CO., Dept. 227K, Racine, Wis.

HERE'S

BILL JACKSON

SUCCESS

WAYS!

367

Bill Jackson came home from the Air Force, skilled in the tools of modern airpower...

Bill found a job in the building industry. His progress has been steady . . . the last house he built was his own!

Somehow, though, he felt something was missing. Maybe it was the powerful roar of an engine run-up... or how it feels to talk airman's talk...

Maybe it was that sense of "belonging," of being part of a fine group of guys working together on a great Air Force team...

Then he joined the Air Force Reserve!

Now he's part of the team again . . .

Content that he's doing two big jobs . . . happy to be among those trained
Air Force veterans who stand ready to lend a hand in the business of defense.

For information about YOUR place in the Air Force Reserve, call, write or visit your local Air Reserve Center



new shop equipment . . .

its Tiny Toggles, which are very small toggle clamps. These Tiny Toggles are only 3/4 inch high and 23/4 inches long when closed. Yet they provide a holding pressure up to 42 pounds.

As may be noted from the illustration, there are four models-105-UB (upper left), 105-U (upper right), 105-



De-Sta-Co Model 105 Series Toggle Clamps

THE HELIOS

50 EK VERNIER CALIPER

With Automatic Thumb Lock . . . With all Inch Scales or one Inch and one Metric Scale:

\$9.90

The 55 A with set screw lock with one Inch and one Metric scale or all Inch scales

\$8.90

All prices F.O.B. New York

Also avallable . . .

Dull Chrome finish calipers and Dial Indicator calipers

For details on other imported precision instruments, write

6" SCALE

HARDENED

Guaranteed

Accuracy

within .001"

Double Length Vernier

NEISE MODERNTOOLS

KARL A. NEISE, Dept. MMS 404 Fourth Avenue New York 16, N. Y.

For more data circle 683 on Reader Service Card

SB (lower right) and 105-S (lower right). The U and UB models both have U bars for holding adjustment spindles, which are furnished with all four 105 De-Sta-Co's. However, the U has a horizontal base, whereas the UB has a vertical base.

There is the same difference between the 105-S and the 105-SB, only these Tiny Toggles have solid holding bars. Between the four, these clamps will solve many workholding problems where small clamps with relatively light holding pressures are needed. Each of the four 105's also comes with a base spacer mounting plate, as shown in the accompanying illustration. This plate is 3/32 inch thick and provides a quick practical means by which different thicknesses of workpieces may be handled or different mounting positions accommodated.

Other accessories for the clamps include two flange washers and two locknuts for the 105-U and 105-UB.

For more data circle 167 on Reader Service Card

Rowbottom's exclusive experience in cam production is assurance your needs can be met promptly, economically...and is your guarantee of satisfaction. All types. Any quantity, Send specifications.

THE ROWBOTTOM MACHINE CO. WATERBURY . CONNECTICUT

Also builders of Cam Milling and Cam Grinding Machines. Details on request.



For more data circle 684 on Reader Service Card

IND

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IMM





All kinds of BALL & ROLLER THRUST BEARINGS

Flat...self aligning...double action...grooved...double direction. Can make bearings up to 25" diameter. Also equipped to repair and regrind bearings.

Immediate delivery on most bearings.

ACORN BEARING COMPANY

(Established 1917)

68 Stanley Street

New Britain, Conn.

For more data circle 686 on Reader Service Card



By actual independent laboratory test, this grease has proved to have lubricating qualities unequalled by any other lube. Write on your company letterhead for FREE sample tube.

STANDARD DIE SET MFRS., INC. 1503 Elmwood Ave., Providence 7, R. I.

NOW YOU CAN HAVE ...



SPEED, ACCURACY, RIGIDITY, VERSATILITY, UNLIMITED OPERATIONS

FR4

MULTI-DUTY
TOOLING SYSTEM

different types of Tool Adapters

different sizes of Tooling Systems You can modernize your Lathe with a Fry Multi-Duty Tooling System at surprisingly low cost. Drill, Bore, Turn, Face, and perform precision tapping profitably. Fry Tooling will provide:

 Unlimited operations in one chucking
 Split second Adapter change with .0002" repeat accuracy
 Lathe operation
 80% of the time
 Tool changing only when bits become dull
 Double usefulness of your present Lathe.

Exclusive representation available in some localities

FR4

FRY TOOL MFG. CO. EATON, OHIO

For more data circle 687 on Reader Service Card



A truly high precision chuck developed to meet exacting requirements. The method of clamping the largest possible area of the circumference permits minimum use of pressure; fragile work is never deformed or crushed. In order to maintain this advantage chucks over 4" capacity are equipped with eight jaws. Removable jaws are available in a wide variety of styles for internal or external chucking, or they may be had in blank form suitable for your own machining. Simple design permits quick and easy replacement of the shank, and shanks to suit special requirements may be machined at minimum cost in any shop. Six sizes from 2" to 6" to fit all machines. Furnished with or without shanks.



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October, 1957

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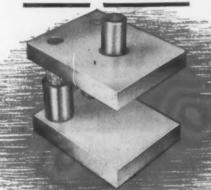


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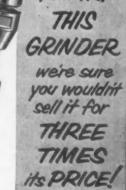
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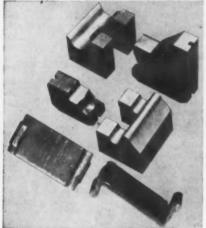


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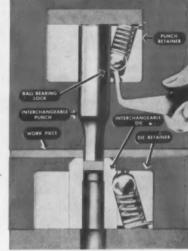
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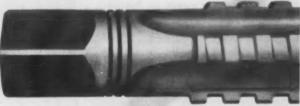
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